# Institutional Governance Quality as a Determinant of Energy Investments: Evidence from a Panel of 17 EU Countries

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**Abstract:** The European energy transition requires the mobilisation of capital flows estimated at more than €1 trillion annually, highlighting the importance of institutional governance quality in attracting and sustaining energy investments. The ability of states to provide credible regulatory frameworks, governance effectiveness, and institutional stability has become relevant for financing energy infrastructure and supporting long-term investment decisions. Underscoring the institutional theory, this study investigates the relationship between institutional governance quality and energy sector investments for a balanced panel of 17 EU member-states over the 2010-2023 period. The analysis employs gross fixed capital formation in the energy sector (Energy GFCF) as the primary dependent variable, complemented by net foreign direct investment inflows (Net FDI). Institutional governance quality is measured using the Worldwide Governance Indicators (WGI) and an original OECD Composite Convergence Index (OCCI). The empirical analysis relies on two-way fixed effects and random effects panel models with country-clustered robust standard errors. The findings indicate that institutional governance quality is associated primarily with structural differences in energy investments across economies rather than with short-term annual variations within countries. While fixed effects estimations do not identify significant annual governance effects across EU countries, random effects models reveal a positive and significant structural relationship between governance quality and energy investments. Government effectiveness exerts a positive association on energy investment dynamics, suggesting that predictable and credible regulatory environments play an important role in energy capital allocation. Particular results are underscored for Central and Eastern European economies characterised by significant infrastructure needs and persistent institutional gaps. For Romania and Bulgaria, in process of joining OECD, institutional convergence is positively associated with both Energy GFCF and FDI inflows, suggesting that OECD accession reforms may function as a signalling mechanism for institutional investors. Overall, findings highlight the importance of institutional convergence for mobilising the investments required to support the European energy transition.

**Keywords***:* Institutional governance quality, Energy investments, Energy GFCF, Foreign direct investment, Worldwide governance indicators, OECD institutional convergence

## 1. Introduction

Recent initiatives such as the European Green Deal and REPower EU have intensified the need for large scale investment in the energy sector. Expanding renewables energy capacity, modernising infrastructure and upgrading transmission and distribution networks require substantial and sustained capital mobilisation across Europe. Given the capital-intensive nature of energy projects and their long payback periods, investment decisions are highly dependent on regulatory stability and institutional quality. Several studies show that investors pay close attention to institutional governance quality, especially in sectors exposed to political and regulatory risks (Globerman & Shapiro, 2002; Buchanan et al., 2012). Bruno et al. (2021) argue that the EU investment advantage is not explained only by market integration. Institutional credibility and regulatory stability also play an important role. Consequently, the quality of governance has become an increasingly important factor in attracting and sustaining long-term investment.

However, the relationship between institutional governance and investment remains far from straightforward and does not appear to be uniform across countries. Investors operating in highly regulated sectors are more likely to react to sustained institutional credibility than to short-term policy changes. This is important in the energy sector, where investment projects usually involve long planning horizons and high regulatory exposure.

The issue is particularly important in Central and Eastern Europe, where energy infrastructure needs remain high and institutional differences compared to Western Europe are still visible (Dobrowolska et al., 2023). Such differences may affect not only the attractiveness of energy sectors for investors but also the ability of governments to implement and sustain long-term energy transition strategies. For countries undergoing institutional convergence, accession process can serve as signals of credibility, reducing perceived risks and strengthening investor confidence in future reforms.

Despite substantial research on governance and investment, evidence on investment in the energy sector remains limited. Most existing studies use aggregate investment indicators, such as FDI or GFCF, paying less

attention to investments made specifically in the energy sector. Consequently, the specific role of institutional governance quality in energy sector investment remains less understood.

For these reasons, this paper focuses on the relationship between institutional governance quality and energy investment across a balanced panel of 17 European Union member states over the period 2010-2023. Gross fixed capital formation in the energy sector serves as the primary investment dependent variable, complemented by net foreign direct investments as an alternative measure of investment dynamics. Institutional governance quality is measured through the Worldwide Governance Indicators (WGI), while an original OECD Composite Convergence Index (OCCI) is introduced in robustness analyses to capture reform commitment associated with OECD accession processes.

The study aims to answer three research questions: *RQ1. Does institutional governance quality influences energy investments primarily through internal variation or structural differences between economies?; RQ2. Which governance dimensions exert the strongest influence on energy investment?; and RQ3. Does institutional governance quality affect energy investments differently in Romania and Bulgaria (countries still in accession process) compared with the broader EU sample?*

The results suggest that institutional governance quality influences energy investments mainly through long-term structural differences between economies rather than through short-term country variation. Moreover, the individual governance dimensions do not affect investment decisions in the same way in the energy sector. In addition, the findings point to a stronger role of institutional convergence in countries undergoing active reform processes, such as Romania and Bulgaria.

The rest of the paper is structured as follows: Section 2 provides the literature review of seminal research on institutional governance quality and energy investments nexus. Section 3 describes the methodology, while the results of the study are presented in Section 4. The last section addresses conclusions on the main findings, along with their practical implications and the future research approaches.

## 2. Literature Review

The European energy transition has increased the need for long-term investment in energy infrastructure, renewable capacity, and production-system modernization. Achieving these objectives requires not only financial resources but also institutional conditions that reduce uncertainty and strengthen investor confidence. As a result, governance quality has become an important factor shaping investment decisions, particularly in sectors characterized by high regulatory exposure and long planning horizons.

A broad body of literature identifies institutional characteristics as key determinants of investment decisions through their effects on transaction costs, legal protection, and policy predictability. Studies show that stronger governance improves investment attractiveness and supports both domestic and foreign financing (Globerman & Shapiro, 2002; Buchanan et al., 2012; Gokceli, 2023). More recent evidence confirms that robust institutional governance continues to drive investment flows by reducing transaction costs and signalling regulatory credibility to international investors (Arogundade et al., 2026). In the specific context of the energy sector, Ouia and El Bettioui (2026) demonstrate that superior governance facilitates capital mobilization in large-scale energy projects by increasing regulatory clarity and policy credibility. At the supranational level, Bruno et al. (2021) further argue that the investment premium associated with EU membership reflects the benefits of deep institutional integration and regulatory stability.

Institutional theory suggests that governments influence economic decisions by reducing uncertainty and providing stable rules for investment (North, 1990). This perspective is particularly relevant for the energy sector, where projects are characterized by high capital intensity, long payback periods, and strong dependence on stable regulatory frameworks. Buterin et al. (2017) demonstrate that institutional reforms reducing transaction costs and increasing government efficiency are essential prerequisites for long-term infrastructure development. Similarly, Gokceli (2023) show that institutional quality significantly influences foreign direct investment flows, particularly in economies with strong regulatory frameworks. Together, these studies provide the theoretical basis for examining how governance quality and OECD institutional convergence influence energy investment decisions in the analysed panel of EU member states.

Evidence from European economies suggests that governance dimensions affect investment through different channels. Dobrowolska et al. (2023) show that regulatory quality is more closely associated with inward FDI, whereas the rule of law plays a stronger role in outward investment decisions. These findings suggest that composite governance indicators may mask important differences between institutional dimensions.

Recent evidence suggests that institutional effects emerge primarily through long-term structural processes rather than short-term policy changes. Investors in highly regulated sectors tend to respond more strongly to sustained improvements in governance than to annual fluctuations in institutional quality (Gokceli, 2023). Evidence from the energy sector further highlights this complexity. Governance quality appears to reduce the risks associated with foreign capital and facilitate sustainable investment allocation, while also supporting renewable energy development through stronger implementation capacity (Fang et al., 2024; Rafiq et al., 2025). Other studies suggest that domestic energy investment and FDI may respond to different institutional mechanisms (Ouia & El Bettioui, 2026).

The relationship between governance and investment is particularly important in transition economies, where institutional reforms may serve as credibility signals that reduce perceived investment risks. For economies undergoing OECD accession processes, institutional convergence may strengthen reform credibility and increase investor confidence. Triarchi et al. (2024) emphasize that political stability and rule of law significantly influence environmental policy implementation and transition objectives. In this sense, convergence toward OECD standards may operate as a signalling mechanism, influencing both domestic investment and foreign capital attraction in highly regulated sectors.

## 3. Research Methodology

This study examines the relationship between institutional governance quality and energy investments across European Union member states between 2010 and 2023. A panel approach allows the analysis of both cross-country differences and within-country changes over time (Globerman & Shapiro, 2002; Buchanan et al., 2012).

The analysis is based on a balanced panel of 17 EU member-states observed between 2010 and 2023. Countries were selected based on data availability across all variables for the full study period and on the economic relevance of their energy sectors. Ten EU member states were excluded: Hungary, due to exceptional FDI volatility related to multinational restructuring activities that could distort investment estimates, Ireland and Luxembourg, due to their status as financial centres with structurally distorted FDI flows, Malta and Cyprus, due to their very small economic size and incomplete energy investment data and Estonia, Latvia, Lithuania, Slovenia, and Croatia, due to incomplete Energy GFCF data for the studied period. The final sample consists of 238 country-year observations.

The selected timeframe captures several events likely to affect both institutional quality and investment decisions, including the COVID-19 pandemic, the 2022-2023 European energy crisis, and the launch of OECD accession negotiations for Romania and Bulgaria in 2022. These developments provide a relevant context for examining whether institutional governance quality continues to influence investment decisions during periods of heightened uncertainty and institutional change.

To respond to the three research questions, the empirical analysis incorporates variables already validated by previous literature. The econometric models examine how institutional governance quality relates to investment behaviour in the energy sector. Two dependent variables are examined separately, for *foreign and domestic investment indicators,* in order to capture different investment channels and institutional mechanisms (Ouia & El Bettioui, 2026). Net FDI, as a percentage of GDP, captures foreign investors' responses to institutional quality and is widely used in studies of governance and investment (Globerman & Shapiro, 2002; Dobrowolska et al., 2023). Gross fixed capital formation in the energy sector as a percentage of GDP (Energy GFCF) captures long-term domestic investment in energy infrastructure.

*Institutional governance quality* is measured using four out of the six WGI dimensions: Government Effectiveness (GE), Regulatory Quality (RQ), Rule of Law (RL), and Control of Corruption (CC). These indicators have direct relevance to investment decisions, regulatory predictability, and institutional credibility (World Bank, 2025). Political Stability and Voice and Accountability were excluded as they have a less direct relationship with technical energy infrastructure. This selective focus follows Buterin et al. (2017, p. 1579) to avoid the "distorted picture" often provided by aggregate indices. The distinction is further supported by Dobrowolska et al. (2023), who demonstrate that regulatory quality primarily drives inward FDI, whereas the rule of law is more critical for outward investment decisions. Following the WGI 2024 methodology revision (Kaufmann & Kraay, 2024), the four retained dimensions are further grouped into two composite indices: WGI_CAP = (GE + RQ)/2, capturing government capacity to formulate and implement sound policies, and WGI_INST = (RL + CC)/2, reflecting respect for institutions governing economic and social interactions. A simple average of all four dimensions (WGI_AVG) is also constructed as a baseline governance measure.

Further, the model includes GDP growth, the natural logarithm of GDP per capita (lnGDP_pc), Inflation and Trade openness as control variables, frequently associated with investment behaviour in previous literature (Globerman & Shapiro, 2002; Buchanan et al., 2012).

In addition to conventional governance indicators, the analysis incorporates an OECD Composite Convergence Index (OCCI), mainly used for robustness tests. The index follows the methodology proposed by Toth (2026) and measures cumulative adoption of 56 active OECD legal instruments grouped into three thematic domains: governance (24 instruments), finance and investment (22 instruments), and energy and nuclear (10 instruments) (https://legalinstruments.oecd.org). The final OCCI score is calculated as the arithmetic mean of three thematic sub-indices, each defined as the ratio of adopted to total instruments within that domain. Unlike annual governance indicators, OCCI captures long-term institutional reform commitment and is therefore used as a proxy for institutional credibility associated with OECD accession rather than short-term governance fluctuations.

The empirical analysis is based on two separate panel regression models with standard errors clustered by country, estimated for each dependent variable as follows:

*Model 1:*

$$Energy\ GFCF_{(it)} = \alpha + \beta_1 WGI_{(it)} + \beta_2 GDP\ growth_{(it)} + \beta_3 lnGDP\ pc_{(it)} + \beta_4 Inflation_{(it)} + \beta_5 Trade_{(it)} + \mu_i + \lambda_t + \epsilon_{(it)}$$

*where: i = country, t = year; $\mu_i$ = country fixed effects; $\lambda_t$ = year fixed effects; $\varepsilon_{it}$ = idiosyncratic error term.*

*Model 2:*

$$Net\ FDI_{(it)} = \alpha + \beta_1 WGI_{(it)} + \beta_2 GDP\ growth_{(it)} + \beta_3 lnGDP\ pc_{(it)} + \beta_4 Inflation_{(it)} + \beta_5 Trade_{(it)} + u_i + \epsilon_{(it)}$$

*where: $u_i \sim N(0, \sigma^2_u)$ = country random effect; $\varepsilon_{it}$ = idiosyncratic error term.*

In both models, WGI denotes the institutional governance quality variable, which varies across specifications: WGI_AVG (composite average), individual dimensions (WGI_GE, WGI_RQ, WGI_RL, WGI_CC), composite indices (WGI_CAP, WGI_INST), or alternative measures (OCCI, WGI_AVG², WGI_AVG lagged). Each specification is estimated separately, replacing WGI with the relevant governance variable. Model selection between fixed and random effects is based on the Hausman test. Specifically, the two-way specification includes country fixed effects ($\mu_i$), controlling for time-invariant cross-country heterogeneity (unobserved country-specific characteristics that remain relatively stable over time), and year fixed effects ($\lambda_t$), controlling for common shocks affecting all countries simultaneously. Fixed effects were selected for Energy GFCF ($p < 0.001$), while random effects were selected for Net FDI ($p = 0.785$).

Several diagnostic tests were conducted to assess model robustness. Serial correlation was examined using the Wooldridge test, heteroscedasticity through the Breusch-Pagan test, and multicollinearity using variance inflation factors (VIF). Cross-sectional dependence was additionally evaluated using the Pesaran CD test, given the possibility that common European shocks may influence all countries simultaneously. Country-clustered robust standard errors are applied throughout, ensuring that inference remains valid in the presence of within-country dependence.

Further, the two models were re-estimated for five robustness specifications (R1 to R5). R1 uses the alternative estimator for each model (random effects for Energy GFCF; fixed effects for Net FDI). R2 replaces WGI_AVG with the OCCI index. R3 introduces a quadratic governance term ($WGI_AVG^2$) to test for nonlinear threshold effects. R4 uses lagged governance values (one and two years) to account for delayed investment responses. R5 excludes Romania and Bulgaria to assess whether results are driven by OECD candidate countries.

## 4. Results

### 4.1 Descriptive Statistics, Correlations and Diagnostic Tests

Table 1 presents descriptive statistics for all variables included in the analysis, for the sample of 238 country-year observations. Energy GFCF ranges from 0.054% to 4.085% of GDP, suggesting that the importance of energy investment varies substantially across EU economies. Net FDI is much more volatile, ranging from -30.658% to 48.471% of GDP and showing the highest standard deviation among all variables. Governance

indicators also differ across countries, varying between -0.439 (min WGI_CC) and 2.445 (max WGI_CC), with a maximum standard deviation of 0.829. These data reflect persistent institutional differences within the EU member states included into the analysis. The OCCI ranges from 0 to 1 and captures different stages of OECD institutional convergence. This is particularly relevant for Romania and Bulgaria, where the accession process provides an opportunity to examine whether convergence-related reforms are associated with investment dynamics.

**Table 1: Descriptive Statistics**

| Variable | Mean | Standard Deviation | Min | Max |
|---|---|---|---|---|
| **Net FDI** | 2.805 | 7.548 | -30.658 | 48.471 |
| **Energy GFCF** | 1.002 | 0.546 | 0.054 | 4.085 |
| **WGI_GE** | 1.124 | 0.715 | -0.296 | 2.273 |
| **WGI_RQ** | 1.098 | 0.535 | 0.145 | 2.066 |
| **WGI_CAP** | 1.111 | 0.616 | 0.024 | 2.137 |
| **WGI_RL** | 1.100 | 0.662 | -0.337 | 2.109 |
| **WGI_CC** | 1.052 | 0.829 | -0.439 | 2.445 |
| **WGI_INST** | 1.076 | 0.739 | -0.346 | 2.224 |
| **WGI_AVG** | 1.094 | 0.674 | -0.161 | 2.116 |
| **GDP growth** | 1.568 | 3.126 | -10.940 | 8.931 |
| **lnGDP_pc** | 10.308 | 0.584 | 8.833 | 11.147 |
| **Inflation** | 2.499 | 2.994 | -1.736 | 15.325 |
| **Trade openness** | 102.836 | 37.568 | 50.923 | 204.056 |
| **OCCI** | 0.884 | 0.290 | 0.000 | 1.000 |

As expected, the pairwise correlations (not tabulated in here, but available upon request) the four governance dimensions are highly correlated with each other, suggesting that countries with stronger regulatory quality also tend to score higher on government effectiveness, rule of law, and control of corruption. To avoid multicollinearity issues, these indicators are introduced separately in the regression models. Governance measures show moderate negative correlations with Energy GFCF, while their associations with Net FDI are positive but weak. LnGDP_pc is positively correlated with most governance indicators, reflecting the close link between institutional quality and economic development. The OCCI displays a moderate negative correlation with Energy GFCF and almost no correlation with Net FDI.

Before estimating the regression models, several diagnostic tests were performed to assess models' suitability (Table 2). The Hausman test supports the use of fixed effects for the Energy GFCF model and random effects for the Net FDI model. The Wooldridge and Breusch-Pagan tests indicate serial correlation and heteroskedasticity, leading to the use of country-clustered robust standard errors. The Pesaran CD test suggests no cross-sectional dependence in the Energy GFCF model but indicates cross-sectional dependence in the Net FDI model. Finally, VIF values remain well below the conventional threshold of 10, suggesting that multicollinearity is not a concern.

**Table 2: Diagnostic tests**

| Test | Dependent variable | Statistics | p-value |
|---|---|---|---|
| **Hausman** | Energy GFCF | chi2(5) = 61.311 | < 0.001 |
| **Hausman** | Net FDI | chi2(5) = 2.443 | 0.785 |
| **Wooldridge** | Energy GFCF | chi2 = 60.602 | < 0.001 |
| **Wooldridge** | Net FDI | chi2 = 93.586 | < 0.001 |
| **Breusch-Pagan** | Energy GFCF | BP = 181.905 | < 0.001 |
| **Breusch-Pagan** | Net FDI | BP = 337.614 | < 0.001 |
| **Pesaran CD** | Energy GFCF | z = 0.246 | 0.806 |
| **Pesaran CD** | Net FDI | z = 10.996 | < 0.001 |

| Test | Dependent variable | Statistics | p-value |
|---|---|---|---|
| VIF – WGI_AVG | | 5.089 | |
| VIF – GDP growth | | 1.086 | |
| VIF – lnGDP_pc | | 5.056 | |
| VIF – Inflation | | 1.118 | |
| VIF – Trade openness | | 1.118 | |

### 4.2 The Influence of Institutional Governance Quality on Energy Investments

To assess the relationship between institutional governance quality and energy investments in EU member states (RQ1), a fixed-effects model was estimated for Energy GFCF, while a random-effects model was estimated for Net FDI, based on the Hausman test results. Table 3 shows that the composite governance indicator is not statistically significant for Energy GFCF, suggesting that yearly changes in governance quality are not sufficient to generate immediate changes in domestic energy investment. By contrast, the governance indicator is positive and marginally significant for Net FDI, indicating that countries with better governance tend to attract higher levels of foreign investment. Given the long-term nature of energy investments, investors may respond more to persistent institutional conditions than to short-term fluctuations in governance indicators. This interpretation is consistent with Bruno et al. (2021), who highlight that the effects of institutional integration and regulatory stability tend to emerge gradually over time.

**Table 3:** Fixed Effects (Energy GFCF) and Random Effects (Net FDI)

| Variable | Energy GFCF (FE) (Model1) | Net FDI (RE) (Model2) |
|---|---|---|
| WGI_AVG | 0.0054 | 2.5538* |
| *(SE)* | *(0.3740)* | *(1.4891)* |
| GDP growth | -0.0035 | 0.1561*** |
| *(SE)* | *(0.0117)* | *(0.0548)* |
| ln(GDP per capita) | -2.8273*** | -2.8770** |
| *(SE)* | *(0.5399)* | *(1.3213)* |
| Inflation | 0.0085 | 0.0867 |
| *(SE)* | *(0.0167)* | *(0.1174)* |
| Trade openness | -0.0019 | 0.0100 |
| *(SE)* | *(0.0083)* | *(0.0095)* |
| $R^2$ within | 0.3182 | 0.0239 |

Note: N = 238 observations. *** p<0.01, ** p<0.05, * p<0.10

Table 4 examines governance effects on Energy GFCF (fixed effects) and Net FDI (random effects) across three levels of aggregation for WGI indices: individual, composite (WGI_CAP and WGI_INST), and overall average (WGI_AVG). This approach seeks to identify the governance dimensions that exert the strongest influence on energy investment, responding to RQ2. For Energy GFCF, none of the governance specifications produces statistically significant effects, confirming the pattern observed in Table 3. For Net FDI, government effectiveness is the most significant individual dimension, while WGI_CAP shows a marginal positive impact. These results suggest that aggregation matters: individual dimensions reveal differentiated effects that composite averages may obscure.

**Table 4: WGI dimensions' influence on energy investments**

| WGI specification | Energy GFCF (FE) | | Net FDI (RE) | |
|---|---|---|---|---|
| | Coef. | $R^2$ within | Coef. | $R^2$ within |
| *A. Individual WGI dimensions* | | | | |
| WGI_GE | -0.2691 | 0.3249 | 3.2159** | 0.0302 |
| *(SE)* | *(0.1650)* | | *(1.6020)* | |
| WGI_RQ | 0.5335 | 0.3339 | 2.1485 | 0.0210 |

| WGI specification | Energy GFCF (FE) | | Net FDI (RE) | |
|---|---|---|---|---|
| | Coef. | R² within | Coef. | R² within |
| *(SE)* | *(0.3472)* | | *(1.5069)* | |
| WGI_RL | -0.2150 | 0.3204 | 1.7938 | 0.0190 |
| *(SE)* | *(0.3725)* | | *(1.4928)* | |
| WGI_CC | 0.1251 | 0.3190 | 1.7970* | 0.0216 |
| *(SE)* | *(0.2828)* | | *(1.0469)* | |
| | | | | |
| *B. Composite indices 2×2 (WGI 2025 methodology: Aspects 2 and 3)* | | | | |
| WGI_CAP | 0.0503 | 0.3183 | 3.0043* | 0.0264 |
| *(SE)* | *(0.3409)* | | *(1.5906)* | |
| WGI_INST | -0.0505 | 0.3182 | 1.9904 | 0.0211 |
| *(SE)* | *(0.4244)* | | *(1.2970)* | |
| | | | | |
| *C. Overall average (4 dimensions)* | | | | |
| WGI_AVG | 0.0054 | 0.3182 | 2.5538* | 0.0239 |
| *(SE)* | *(0.3740)* | | *(1.4891)* | |

Note: N = 238 observations. *** p<0.01, ** p<0.05, * p<0.10. Each row is a separate model. Controls included in all models. SE clustered by country.

Table 5 reports the results for the Romania & Bulgaria subsample, the two countries with OECD candidate status, and not full member. The findings respond to RQ3 showing that institutional governance quality affects energy investments differently in Romania and Bulgaria compared with the full EU sample. While the composite WGI indicator is significant only for Net FDI, the OECD Composite Convergence Index (OCCI) has a positive and highly significant effect on both Energy GFCF and Net FDI. These results suggest that, in economies undergoing institutional convergence, investors respond not only to the current quality of governance but also to credible signals of future reforms. The individual and composite WGI indices provide additional evidence of heterogeneous effects. Rule of Law is positively associated with Net FDI, while Control of Corruption is negatively associated with Energy GFCF and positively associated with Net FDI. By contrast, Regulatory Quality is negatively associated with Energy GFCF and insignificant for Net FDI. WGI_INST is marginally significant for Energy GFCF and highly significant for Net FDI, suggesting that the combination of rule of law and control of corruption represents a particularly relevant institutional channel for foreign investment in economies undergoing active reform.

**Table 5: Romania & Bulgaria subsample**

| Specification | Coef. | R² within | Coef. | R² within |
|---|---|---|---|---|
| | Energy GFCF (FE) | | Net FDI (FE) | |
| *A. Overall governance indicators* | | | | |
| WGI_AVG | -3.6602 | 0.4581 | 2.9693*** | 0.3293 |
| *(SE)* | *(2.6760)* | | *(0.5451)* | |
| OCCI | 4.6096*** | 0.4473 | 11.8530*** | 0.4484 |
| *(SE)* | *(0.8198)* | | *(0.0149)* | |
| | | | | |
| *B. Individual WGI dimensions* | | | | |
| WGI_GE | -0.0752 | 0.4319 | -0.0092 | 0.3051 |
| *(SE)* | *(2.2802)* | | *(0.3042)* | |
| WGI_RQ | -4.6383*** | 0.5195 | 0.5458 | 0.3068 |
| *(SE)* | *(0.7374)* | | *(0.8973)* | |
| WGI_CC | -2.3768*** | 0.4550 | 2.4704** | 0.3402 |
| *(SE)* | *(0.4868)* | | *(0.9688)* | |
| WGI_RL | 0.2302 | 0.4320 | 5.6195*** | 0.3916 |

| | | | | |
|---|---|---|---|---|
| ***(SE)*** | *(1.8981)* | | *(1.4120)* | |
| | | | | |
| *C. Composite indices 2×2 (WGI 2025 methodology)* | | | | |
| **WGI_CAP** | -2.4328 | 0.4554 | 0.2721** | 0.3055 |
| ***(SE)*** | *(2.9928)* | | *(0.1189)* | |
| **WGI_INST** | -2.0118* | 0.4412 | 4.5654*** | 0.3727 |
| ***(SE)*** | *(0.9722)* | | *(0.1856)* | |

Note: N=28 obs. (2 countries × 14 years). *** p<0.01, ** p<0.05, * p<0.10. One-way FE (country effects).

Overall, the results indicate that institutional convergence and selected governance dimensions may play a stronger role in shaping investment decisions in OECD candidate countries than in the broader EU sample. The high and significant impact of OCCI on both Energy GFCF and Net FDI, compared to WGI indicators is consistent with the OECD accession context of the two countries. While annual changes in governance indicators remain relatively limited, the convergence process captures broader institutional commitments that may be more visible to investors. Similar arguments are advanced by Toth (2026), who documents an acceleration of OECD related reforms in Romania and Bulgaria after 2022. This may explain why investors appear to respond more strongly to institutional convergence than to short-term fluctuations in governance indicators. This pattern is consistent with institutional theory. North (1990) argues that stable and credible institutions reduce uncertainty and transaction costs, making countries more attractive to investors. Ouia and El Bettioui (2026) show that governance affects investment through domestic channels that vary with countries' levels of development, while Arogundade et al. (2026) show that the impact of institutional governance on FDI convergence differs across country groups rather than being uniform.

### 4.3 Robustness Tests

Table 6 tests the robustness of the main findings across five alternative specifications for both models simultaneously. Results remain broadly consistent with the baseline. Governance effects on Energy GFCF are not significant across any specification, while Net FDI shows marginal sensitivity to lagged governance, particularly at a two-year horizon. Excluding Romania and Bulgaria removes this sensitivity, suggesting that OECD candidate countries contribute disproportionately to the observed governance-FDI relationship.

**Table 6: Robustness tests**

| Specification | Energy GFCF — Fixed Effects | | | | | Net FDI — Random Effects | | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Coef. | (SE) | | $R^2$ | Coef. | (SE) | | $R^2$ |
| **R1 – Alternative model (RE; FE)** | 238 | 0.4893* | *(0.2679)* | | 0.1659 | 4.4170 | *(6.4002)* | | 0.0103 |
| **R2 – OCCI** | 238 | 0.4195 | *(2.0850)* | | 0.3186 | 1.0104 | *(0.9950)* | | 0.0137 |
| **R3 – WGI_AVG linear** | 238 | -1.2936 | *(0.9910)* | | 0.3397 | 3.5039* | *(1.9292)* | | 0.0233 |
| **R3 – WGI_AVG²** | -- | 0.7136* | *(0.3957)* | | -- | -0.3657 | *(0.5769)* | | -- |
| **R4 – WGI_AVG lag(1)** | 221 | 0.1129 | *(0.5069)* | | 0.3183 | 2.6626* | *(1.3530)* | | 0.0225 |
| **R4 – WGI_AVG lag(2)** | 204 | 0.3557 | *(0.5831)* | | 0.3271 | 2.8526** | *(1.1524)* | | 0.0278 |
| **R5 – Without Romania & Bulgaria** | 210 | -0.0169 | *(0.3779)* | | 0.1439 | 2.8402* | *(1.6913)* | | 0.0245 |

Note: *** p<0.01, ** p<0.05, * p<0.10. SE clustered by country.

## 5. Conclusions

This study examined the relationship between institutional governance quality and investment in the energy sector across 17 EU member states during 2010-2023. Using panel-data models, the analysis focused on Energy GFCF and Net FDI while also considering the role of OECD institutional convergence, measured with an original OCCI indicator.

The results indicate that institutional governance quality influences energy investment primarily through persistent institutional differences across countries rather than through short-term annual changes within countries. While governance indicators are generally not significant in fixed-effects estimations, positive relationships emerge in specifications that capture cross-country variation. This suggests that investors respond more strongly to stable institutional environments than to year-to-year fluctuations in governance

quality. The Romania-Bulgaria analysis provides additional evidence that institutional convergence may play a distinct role in economies undergoing reform. Unlike the full EU sample, the OECD Composite Convergence Index (OCCI) is positively associated with both energy investment and foreign direct investment. These findings suggest that investors pay attention not only to current institutional conditions but also to credible signals regarding future reforms and policy commitment. This finding is consistent with institutional theory. North (1990) argues that stable and predictable institutions reduce uncertainty for economic actors. Gokceli (2023) similarly shows that credible institutional frameworks support FDI attraction in OECD economies, while Buterin et al. (2017) argue that institutional reforms that lower transaction costs support broader economic growth in transition economies.

The study contributes to the literature in three ways. First, it highlights the difference between short-term governance dynamics and long-term institutional conditions. Second, it introduces OECD institutional convergence as a complementary perspective for understanding energy investment behaviour. Third, it provides evidence from Romania and Bulgaria, two countries currently engaged in the OECD accession process, where institutional convergence appears to be particularly relevant for investment decisions in energy. From a policy perspective, the findings suggest that attracting investment for the energy transition requires more than isolated reforms. Investors appear to value consistency, legal predictability, and credible long-term commitments. In candidate countries, progress toward OECD standards may strengthen confidence in the institutional environment and support both domestic and foreign investment.

Several limitations should be acknowledged. The analysis covers a limited number of EU countries and focuses on aggregate investment indicators. Future research could extend the sample as additional OECD candidate countries become available and examine specific energy technologies or investment channels. Further studies could also explore the mechanisms through which institutional convergence affects investor expectations and behaviour.

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