The Role of the Foreign Direct Investments for the Carbon Emissions Reduction Targets

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Abstract

For the European Union economy and, especially, for the manufacturing industries, achieving the climate agenda goals requires a fundamental reconfiguration of the entire value chain, from production to transportation and to distribution, based on the reduction of the CO_2 emissions and a strict carbon management.
While energy proved to be a main driver for sector localization through specialization (Branger, Quirion and Chevallier, 2017), energy intensive sectors resorted to relocate key energy intensive value chains in regions with low-cost energy resources (Naegele and Zaklan, 2019). However, in the energy transition, laggard economies that will make slow steps towards decarbonization might see their competitiveness to be affected (Eicke and Goldthau, 2021).
Therefore, authors of this paper aimed to highlight the most relevant correlations and causal relationships between foreign direct investment flows (FDIs), the flows of exported goods and carbon emissions (CO_2) in an economic landscape with a challenging pillar of environmental resilience, positive corelated to the new competitiveness.
To meet the objectives of the research, we used empirical quantitative and qualitative methods. To identify the decarbonization agendas of the top 10 listed companies in Germany, France, Italy, the Netherlands, and Austria, 27 documents and 18 web sources were processed, and we used open coding in Atlas.ti for a content analysis. We also developed two gravity models based on time series data published by Eurostat, the Central Bank of Romania, and the Romanian National Institute of Statistics. The reason was to point out, using the EViews software, the causal relationships between FDI's and CO_2 emissions. The method chosen was panel least squares and we sought to identify cross section random effects by applying the Haussman test.
It can be said that the results of the two econometric models may indicate a possible carbon leakage effect in the EU, resulting from FDI's. However, companies of Romania's main partner countries have set clear targets to achieve on Scope 3. This will automatically influence the production chain to decarbonize at all levels. Failure to follow this paradigm could have negative effects on the competitiveness of Romanian exports.

Keywords

Foreign direct investments; trade; CO_2 emissions; exports.

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Introduction

Profoundly technological paradigm shifts, advancing trade liberalization process and the increased mobility of technology, human resources financial capital and flows of ideas have strengthened economic and commercial interdependencies and diversified business models and types of economic flows.

An advanced internationalization process and the development of new industrial clusters have increased the complexity of flows in goods and services, by intensifying outsourcing, vertical disintegration of production processes and their expansion into networks.

More and more economic actors, public or private, confronted with these new challenges, were determined to ask for revised public policies and regulations, and perform new business means to capture new

opportunities linked to a different regional and global trade landscape. At the European Union level, it increased the necessity to implement new pillars of a post-pandemic sustainable development agenda, with environmental and digital resilience requirements. Having in mind the Green Deal strategic package of objectives and activities, in special the goal to obtain an environmental neutrality, the decarbonization efforts undertaken by companies will be the most relevant indicators for their successful participation in the intra-EU good deliveries and, ultimately, in the global trade. In this context, foreign direct investment can play a multi-facet positive role in the flow of the intra-Community goods, in order to create and strengthen low or zero carbon value chains.

Therefore, authors of this paper aimed to highlight the most relevant correlations and causal relationships between foreign direct investment flows (FDIs), the flows of exported goods and carbon emissions (CO2) in an economic landscape with a challenging pillar of environmental resilience, positive corelated to the new competitiveness. In this regard, the authors used quantitative and qualitative research methods and used panel data and tested several gravity models to identify the interdependencies between all these indicators.

1. Review of the scientific literature

In a new globalization stage, specific for a new millennium, with an increased level of the world economic integration, the most visible results were seen in the increasing demand for differentiated manufactured goods and services, which spurred trade flows and the intra-industrial specialization. While energy proved to be a main driver for sector localization through specialization (Branger, Quirion and Chevallier, 2017), energy intensive sectors resorted to relocate key energy intensive value chains in regions with low-cost energy resources. Before issuing the Green Deal, this was one of the main recipes that have been applied to maintain the competitiveness of the production costs (Gerlagh, Mathys and Michielsen, 2015).

The energy transition, placed by the European Union in the middle of a complex regulatory and institutional package, is a very specific component of a process to stimulate the post-pandemic economic recovery, in order to rewrite the principles of cheap fossil fuel-based offshoring. The most powerful tools used by the European Commission are the ETS system and the future carbon border adjustment mechanism. At the same time, companies must respond to the EU's growing focus towards sustainability, which means that the production, the supply and the consumption of goods must be based on a low or net zero carbon content. This shift is drawn both by policymakers and by the increasingly prominent role of the ESG investors, who begun to redirect their capital flows from economic activities with high carbon footprints towards the sustainable ones.

Ecke and Goldthau (2021) draws attention to the asymmetric distribution of the energy transition and opens the discussion about the laggard economies exposed to the risk of making slow steps towards decarbonization. In this respect, the authors stressed that energy transition will increase the consumption of products that contribute to decarbonization. Thus, companies will be determined to find the appropriate answer to accommodate the demand through the restructuring of the value chains, while considering and measuring the carbon footprint of their suppliers. This phenomenon, in the view of the authors, will tend to hurt industries or even the entire economic landscape especially in economies that still want to have a high dependency on fossil fuels (Eicke and Goldthau, 2021).

Another author (Rokhmawati, 2021) underlined that emission reduction measures depend on expensive investments and companies will end up in generating less cashflow, which will have spillover effects at the competitiveness level. This analytical perspective was mentioned earlier by Porter and van der Lide (1985), who noted that the dynamism that characterizes the competitive environment determines companies to constantly identify innovative solutions to meet the market and regulatory challenges, including environmental ones.

To tackle the regulatory risk, the quickest option was to relocate energy intensive value chains in certain regions where the CO2 policies were friendlier, generating this way a carbon leakage effect (Banque du France, 2020). According to a definition, carbon leakage occurs between „a domestic region featuring an emissions policy and a foreign region with no policy or a less stringent policy" (Naegele and Zaklan, 2019).

However, one of the strategic goals of the European Union is to reset the basis of the multi-lateral trade by building a green economy. Therefore, the sustainable option is to produce less or zero carbon intensive products, using renewables as feedstock or as an energy carrier in the primary and in the power mix (Epurescu, 2021). To meet the scientific requirements for reducing the CO2 emissions, companies must implement a series of specific measures.

The GHG Protocol (2020) made a classification of these emissions, segmenting them according to the type of production process and economic activity:

- Scope 1: direct emissions from the production process
- Scope 2: indirect emissions resulted from the heat, power and type of fuel used during the economic activity
- Scope 3: indirect emissions which are not included in Scope 2 and which occur in the entire value chain of the company concerned and which may be generated by directing investments towards unsustainable activities, franchise activities, leased assets, use products manufactured by the company, the transportation and distribution of products, the purchase of goods and services, capital goods, waste, or even for business travel or employee transportation.

By far, the most complex CO2 taxation regime has been implemented in the European Union. This is the ETS, a cap-and-trade system, which charges power producers and energy-intensive industries for the CO2 emissions resulting from the production and for the power used during the industrial processes. Many industries, such as refining, steel or metallurgy, currently receive free allocations for the full volume of CO2 emissions from Scope 1, while they need to purchase ETS certificates for at least 25% of the emissions resulted from the power that is used.

Once the border carbon adjustment mechanism will be implemented in 2023, free ETS allocations for Scope 1 emissions will start to decline, leading companies to implement more measures to limit their carbon footprint. Given that a significant number of companies have started to announce net zero emissions targets, the biggest challenge will be to reduce emissions in Scope 3, ie those in the value chain and those resulting from the use of the final product. At the same time, behind this effort lie the biggest opportunities. While so far, companies were focused on reducing emissions from Scope 1 and especially Scope 2, emissions from Scope 3 are estimated to be 5.5 times higher than those from Scope 1 and Scope 2 combined. Reducing emissions in Scope 3 is key: if additional measures will be taken, this will ensure that emissions are not pushed to other areas of the value chain and that companies will be encouraged to be part of a sustainable value chain (Stanford, 2021).

Given that value chains are scattered in many cases across borders, in this case, a substantial role is played by the foreign direct investments (FDI). It is well known that, in many cases, FDIs had a positive impact on stimulating economic growth, by creating new jobs, stimulating competition, increasing the wages, or diversifying the production and the trade.

As some authors point out, there have been numerous attempts to demonstrate a direct relationship between FDIs and the CO2 emissions either at the industrial or macroeconomic level, to support the thesis of the carbon leakage phenomenon. The results are not conclusive.

For example, in a study about Latin America and FDIs, one highlighted the fact that FDIs inflows in energy-intensive industries could be connected with a steady rise in CO2 emissions during 1980-2007 (Blanco, Gonzales and Ruiz, 2013). On the other hand, other studies have shown that the presence of FDIs stimulated technological innovations which contributed to reducing the carbon emissions (Lin, et al., 2022). The lack of consensus in the literature regarding how FDIs might influence the evolution of the carbon emissions at macro, mezzo and micro level highlights the need for a greater clarity on behalf of the companies' reporting on emission sources.

2. Research methodology

The research started from the hypothesis that there is an interdependent relationship between foreign direct investment and the reduction of carbon emissions. Therefore, we aimed to demonstrate that the foreign direct investments allocated from Germany, France, Italy, the Netherlands, and Austria in various economic sectors in Romania have a positive effect in reducing their carbon emissions at the national level. At the same time, we tried to highlight what the rationale and motivation for such a strategy might be and why decarbonization is important for multinational companies located in these countries.

The selection of the five countries was based on the following criteria:

- The companies registered in Germany, France, Italy, the Netherlands, and Austria contribute to Romania with substantial foreign direct investments, according to Romania's National Statistics Institute

- These countries are among Romania's main trading partners, according to the Central Bank of Romania – 63% of the value of Romania's intra-EU deliveries were in Germany, France, Italy, Austria and the Netherlands

- Germany, France, Italy, and the Netherlands had, in 2019, one of the highest annual GDP levels among EU countries, while Austria had one of the highest GDP in the Eastern European region, according to Eurostat

- At the same time, the top four countries have the highest annual CO2 emissions in the EU, according to Eurostat, while Austria set itself to be carbon neutral in 2040 at the national level.

2.1. Quantitative method

We used this method to analyze the decarbonization targets and the roadmaps of the top 10 listed companies in Germany, France, Italy, the Netherlands, and Austria. To identify these companies, we used the database of the value.today website and the selection criterion was the market capitalization of these companies.

To identify the decarbonization agendas of these companies and their net zero pledges, 27 documents and 18 web sources were processed, and we used open coding in Atlas.ti for a content analysis.

The content analysis had 3 stages:

- For Stage 1, we used the keywords „Scope 1", „Scope 2" and „Scope 3" to identify the decarbonization targets.

- In Stage 2, we wanted to identify the decarbonization roadmaps. Therefore, we used the above keywords to make three groups of codes called Scope 1, Scope 2, Scope 3 which contained the following keywords: „own operations", „carbon capture", „carbon storage", „carbon offset", „energy efficiency ", „building retrofitting", „coal phase out", „renewable energy", „power grid", „hydrogen", „biomethane", „LNG", „natural gas" , „supply chain", „EV" and „battery cell production"

- In Stage 3, we used the keywords „net zero" and „carbon neutral" to search for the net zero pledges and timelines.

2.2. Qualitative method

We developed two gravity models based on time series data from Eurostat and the Romanian National Institute of Statistics to point out, using the EViews software, the causal relationships between foreign direct investment and carbon emissions.

The analyzed period was 2010-2019 and we used as a reference the FDIs from this period carried out by Germany, France, Italy, the Netherlands, and Austria in Romania.

Cross section random effects were tested and the Haussman test was used. The method chosen was panel least squares.

We used logarithmic data of the following indicators:

- LNFDI – Foreign Direct Investments made during 2010-2019 by Germany, France, Italy, the Netherlands and Austria

- LNROCO2EXP – CO2 emissions embodied in Romania's exports

- LNCO2FCPC – CO2 emissions generated by fuel combustion in partner country

- LNGDPPC – GDP evolution in partner country

- LNCO2FCPCEI – CO2 emissions generated by the energy industry in the partner country

- LNCO2FCRO - carbon dioxide emissions resulting from the burning of fossil fuels in the primary energy mix in Romania.

3. Results and discussions

After performing the quantitative analysis, we identified the following results:

- Out of 50 leading EU companies that were analysed, 13 companies have net zero commitments backed up with clear roadmaps and targets for all the type of emissions, 25 companies have just net zero pledges and different Scope targets but not a certain roadmap, while 12 companies haven't committed yet to any net zero targets (commitments or pledges)

- Daimler, Schneider Electric, ENI, ASML, Shell, OMV and Unilever are the leading EU companies with clear roadmaps for emission reductions and net zero targets

- All the 38 companies with at least net zero pledges are either present through subsidiaries in other European Union countries or have integrated EU companies into their value chain strengthening, in this way, the intra-EU deliveries, both with raw materials and intra-industrial products

- Most of the banks, investment funds and insurance companies that were under this analysis have joined multilateral initiatives, such as the Alliance of Net-Zero Asset Owners Alliance, pledging to gradually reduce their investment in fossil fuels until they are removed completely from their portfolio

- In the manufacturing, service and retail production sectors, the measures have a threefold purpose: reducing carbon emissions from own operations, increasing the share of renewables in energy consumption, and reconfiguring the relationship with suppliers in order to obtain green value-added chains.

Analyzing the targets and the roadmaps assumed by these companies, it can be stated that their main objective is to substantially reduce emissions from Scope 1 and 2, following that in a secondary stage to implement measures aimed at reducing emissions from Scope 3. This could mean that foreign direct investment could focus also on outsourcing production capacities to other countries to reduce especially the Scope 1 emissions locally.

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First gravity model

Using the EViews econometric software, the authors used a random cross-section of the data and correlated the random effects using the Haussman test. The R-squared result was 0.910811.

Table no. 1. Results from EViews of the Hausman Test – First gravity model

Variable	Coefficient	Std. Error	t-Statistic	Prob
LNROCO2EXP	-0.305421	0.124088	-2.461323	0.0169
LNCO2FCPC	-3.073710	0.7911297	-3.884392	0.0003
LNGDPPC	1.178802	0.392087	3.006479	0.0040
LNCO2FCPCEI	1.374190	0.452275	3.038397	0.0036

Regarding the gravitational model, it can be summarized by the formula below:

LNFDI = 0.3 LNROCO2EXP - 3.07LNCO2FCPC + 1.17LNGDPPC + 1.37LNCOFCPCEI

Following the obtained results, the authors can indicate the following: if FDIs increase in Romania with 1%, Romania's CO2 embodied emissions in exported goods will decrease by 0.3% and CO2 emissions generated in the partner country due to fuel combustion will decrease by 3.07%. On the other hand, CO2 emissions in the energy industry will increase by 1.17%. Overall, FDIs will also have a contribution in a GDP growth of the partner country by 1.37%.

Second gravity model

In the second gravity model, the authors replaced LNROCO2EXP indicator with the LNCO2FCRO one, indicator that expresses the carbon dioxide emissions resulting from the burning of fossil fuels in the primary energy mix in Romania.

Using the EViews econometric software, the authors used a random cross-section of the data and correlated the random effects using the Haussman test. The R-squared result was 0.901237.

Table no. 2. Results from EViews of the Hausman Test – Second gravity model

Variable	Coefficient	Std. Error	t-Statistic	Prob
LNCO2FCPC	-3.132012	0.864576	-3.622597	0.0006
LNGDPPC	1.646184	0.372583	4.418296	0.0000
LNCO2FCPCEI	1.375371	0.476230	2.888037	0.0055
LNCO2FCPRO	-0.077602	0.378697	-0.204919	0.8384

Regarding the gravitational model, it can be summarized by the formula below:

LNFDI = -0.31 LNCO2FCPC + 1.64LNGDPPC + 1.37LNCOFCPCEI

What might be observed from the results of the Haussman test in this gravity model is that FDI has no effect in reducing the CO2 emissions resulting in Romania from the use of fossil fuels in the primary energy mix. At the same time, the coefficients and probability parameters of the other three indicators remain almost unchanged.

Conclusions

At first glance, it can be said that the results of the two econometric models may indicate a possible carbon leakage effect resulting from FDIs, although they are limited in scope as the authors used a small number of countries and indicators.

This hypothesis is supported by several researchers that studied the problem of carbon leakage. For example, in a study focusing on foreign direct investment in Asia (Sarkodie and Strezov, 2019), it was shown by using the Kuznets curve that foreign direct investment increased the level of CO2 emissions in China and Indonesia. Another study (Lee, 2013) found that foreign direct investment has led to an increase in energy consumption in the G20 member states; however, it has not demonstrated a direct and possible increase in CO2 emissions. On the other hand, the IMF (Borga, 2021) has conducted research to analyse the impact of the FDIs on increasing CO2 emissions in the host economy. The IMF looked at carbon emissions in supply to FDI's Gross Fixed Capital Formation and those embodied in Multinational Enterprises Output / Exports. The IMF's conclusion was that FIDs can have a direct impact on increasing carbon emissions.

Regarding the result of the present research, the fact that the CO2 emissions from the primary energy mix are declining in the partner countries of the FDIs in Romania may suggest that some of the production that generates emissions has been redirected from these countries in Romania.

Goods exported from Romania, however, contribute to the increase in carbon emissions in the origin countries as a result of the energy use. Although an overall reduction in emissions in the partner country is achieved, the increase in CO2 emissions as a result of energy use might have in this scenario two causes. The first cause is that Romania exports goods with a high content of CO2 emissions. In support of this statement, it must be said that the first 20 exporting Romanian companies have an average of 25% share in total exports and represents sectors such as the production of automobiles and car subassemblies, the electronics industry, technology, the production of hydrocarbons and refining and the production of rubber tires. All these industries are energy-intensive and in 2019, for example, according to the Romanian Institute of Statistics, they generated 72.6% of the total carbon emissions of the country, namely over 45 million tons of CO2, out of approximately 62 million tons of CO2. The second reason is that the energy transition is just at the beginning, and that the share of the renewable energy is still not enough to determine a substantial reduction in emissions.

Under these conditions, although FDI has shown that it can successfully contribute to economic development, it can also contribute to reducing carbon emissions. Companies in partner countries that have set clear targets to achieve on Scope 3 will automatically influence the production chain to decarbonize at all levels.

Unfortunately, monitoring emissions from Scope 3 is an extremely difficult task, due to a lack of transparency in the reporting process.

Therefore, many companies focus on Scope 1 and Scope 2 and many net-zero pledges are closely linked to these emissions because they are related to the profile of the economic operations or industrial processes. On the other hand, Scope 3 emissions often form the basis of the iceberg. Although reportedly in larger quantities than Scope 1 and 2, they are lost in the value chain and a company may claim to be green due to its own operations, but in reality, is working with fossil fuel dependent suppliers. And this dependency is either due to the factor endowments or due to their low costs.

In the medium and long term, the champions of the value chain will be the ones who will know how to adapt faster to the climate agenda goals and will have an essential role in reducing emissions on Scope 3. This will require a sense of anticipation that the energy transition will gain traction and will be incorporated not only into climate strategies but also into security of supply national strategies.

References

ASML, 2020. *Climate & Energy*, [online] ASML. Available **here** [Accessed 2 Febryary 2022].

Audi, 2020. *Audi aims to reduce CO2 emissions by 30 percent over the vehicle lifecycle by 2025*, [online] Available **here** [Accessed 2 February 2022].

Banca Națională a României, 2021. *Investițiile străine directe în România în anul 2020*, [online] BNR. Available **here** [Accessed 2 February 2022].

Banque du France, 2020. *CO2 emissions embodied in international trade. Bulletin de la Banque du France*. [pdf] Available **here** [Accessed 22 February 2022].

Blanco, L., Gonzalez, F. and Ruiz, I., 2013. The Impact of FDI on CO 2 Emissions in Latin America. *Oxford Development Studies*, [online] 41(1), pp.104–121. https://doi.org/10.1080/13600818.2012.732055.

Borga, M., 2021. *Measuring Carbon Emissions of Foreign Direct Investment in Host Economies IMF*, [online] Available **here** [Accessed 27 March 2022].

Branger, F., Quirion, P. and Chevallier, J., 2017. Carbon Leakage and Competitiveness of Cement and Steel Industries Under the EU ETS: Much Ado About Nothing. *The Energy Journal*, [online] 37(3). https://doi.org/10.5547/01956574.37.3.fbra.

DHL, 2021. *Deutsche Post and DHL on the road to zero emissions in Germany*, [online] Available **here** [Accessed 27 March 2022].

DSM, 2021. *DSM accelerates science based GHG emissions reduction target to 50% by 2030*. [online] Available **here** [Accessed 3 March 2022].

Edie.net, 2020. *Moncler commits to carbon neutrality and 100% renewable electricity*, [online] Available **here** [Accessed 27 March 2022].

Eicke, L. and Goldthau, A., 2021. Are we at risk of an uneven low-carbon transition? Assessing evidence from a mixed-method elite study. *Environmental Science & Policy*, [online] 124, pp.370–379. https://doi.org/10.1016/j.envsci.2021.07.009.

Enel, 2020. *Net-Zero Ambition*, [online] Available **here** [Accessed 22 February 2022].

Energymonitor, 2021. *Inside BASF's push to net zero*, [online] Available **here** [Accessed 8 February 2022].

ENI, 2021. *Eni's strategy on climate change*, [online] Available **here** [Accessed 8 February 2022].

Epurescu, V., 2021. Some new competitive advantages in the field of energetic paradigm shift from coal and gas towards the blue hydrogen production. *Proceedings of the International Conference on Business Excellence*, [online] 15(1), pp.415–424. https://doi.org/10.2478/picbe-2021-0038.

Erste, 2021. *Erste Group commits to zero emissions target for its lending and investment portfolio*. [online] Available **here** [Accessed 8 February 2022].

EssilorLuxottica, 2021. *Eyes on Carbon*. [online] Available **here** [Accessed 2 March 2022].

Fiercewireless.com, 2021. *Deutsche Telekom picks up the pace on climate targets*. [online] Available **here** [Accessed 17 March 2022].

Generali, 2021. *Generali launches the goals of the net-zero insurance alliance at the G20 climate summit in Venice*, [online] Available **here** [Accessed 17 March 2022].

Gerlagh, R., Mathys, N.A. and Michielsen, T.O., 2015. Energy Abundance, Trade and Specialization. *The Energy Journal*, [online] 36(3). https://doi.org/10.5547/01956574.36.3.rger.

Greenhouse Gas Protocol, 2020. *FAQ.* [pdf] Available **here** [Accessed 2 March 2022].

ING, 2021. *ING to steer to net-zero climate*, [online] Available **here** [Accessed 10 February 2022].

Intesa Sanpaolo, 2021. *Intesa Sanpaolo: Commitment to net-zero emissions by 2050 and joins the net zero banking alliance*, [online] Available **here** [Accessed 10 February 2022].

Kering, 2021. *Climate Strategy 2021*. [pdf] Available **here** [Accessed 15 February 2022].

L`Oreal, 2021. *Fighting Climate Change*, [online] Available **here** [Accessed 15 February 2022].

Lee, J.W., 2013. The contribution of foreign direct investment to clean energy use, carbon emissions and economic growth. *Energy Policy*, [online] 55, pp.483–489. https://doi.org/10.1016/j.enpol.2012.12.039.

Lin, H., Wang, X., Bao, G. and Xiao, H., 2022. Heterogeneous Spatial Effects of FDI on CO 2 Emissions in China. *Earth's Future*, [online] 10(1). https://doi.org/10.1029/2021EF002331.

LVMH, 2021. *LVMH releases Social and Environmental Report, spotlighting initiatives to support sustainable growth*, [online] Available **here** [Accessed 25 February 2022].

Mercedes, 2020. *Ambition 2039: Our path to CO_2-neutrality*, [online] Available **here** [Accessed 20 February 2022].

Merk, 2021. *Merck Accelerates Climate Goals; Announces Carbon Neutrality in Operations by 2025*, [online] Available **here** [Accessed 25 February 2022].

Naegele, H. and Zaklan, A., 2019. Does the EU ETS cause carbon leakage in European manufacturing? *Journal of Environmental Economics and Management*, [online] 93, pp.125–147. https://doi.org/10.1016/j.jeem.2018.11.004.

Nexi, 2021. *Nexi makes ambitious commitment to net-zero emissions by 2040, Science Based Target initiative approves targets for Nexi in Italy*. [pdf] Available **here** [Accessed 25 February 2022].

OMV, 2020. *OMV & Climate Protection*, [online] Available **here** [Accessed 25 February 2022].

Porter, M.E. and Linde, C. van der, 1995. Green and Competitive: Ending the Stalemate. *Harvard Business Review*. [online] 1 Sep. Available **here** [Accessed 17 March 2022].

Rokhmawati, A., 2021. The nexus among green investment, foreign ownership, export, greenhouse gas emissions, and competitiveness. *Energy Strategy Reviews*, [online] 37, p.100679. https://doi.org/10.1016/j.esr.2021.100679.

Sanofi, 2021. *How Sanofi is building a sustainable environment.* [pdf] Available **here** [Accessed 17 January 2022].

SAP, 2022. *Accelerating Our Commitment to Net-Zero*, [online] Available **here** [Accessed 17 January 2022].

Sarkodie, S.A. and Strezov, V., 2019. Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries. *Science of The Total Environment*, [online] 646, pp.862–871. https://doi.org/10.1016/j.scitotenv.2018.07.365.

Schneider Electric, 2020. *Bridging progress and sustainability for all 2020*, [online] Available **here** [Accessed 17 January 2022].

Shell, 2021. *Shell's target is to become a net-zero emissions energy business by 2050, in step with society's progress in achieving the goal of the UN Paris Agreement on climate change*. [pdf] Available **here** [Accessed 15 January 2022].

Stanford, 2021. *Scope 3 Emissions: Measurement and Management*, [online] Available **here** [Accessed 20 February 2022].

Unilever, 2020. *Our roadmap to net zero*, [online] Available **here** [Accessed 20 February 2022].