

# Compliance strategies towards achieving net zero carbon emissions transition in the built environment.

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**Abstract:** The urgent need for a net zero transition of carbon emissions to safeguard the built environment from the devastating impacts of climate change has become a primary concern for the global community. To this end, various countries have developed different rules, regulations, and guidelines to achieve the United Nation's net zero emissions target based on the 2015 Paris Agreement. This study seeks to explore strategies for achieving compliance in the quest for a net zero emissions transition. An integrative literature review technique was adopted for this study to gain insights into relevant compliance strategies for transitioning to net zero carbon emissions within the built environment to achieve this goal. The results revealed that the different climate change response policies on greenhouse gas (GHG) emissions across the globe are time-based, with each country establishing transition strategies to regulate emissions while promoting alternative clean energy. However, the low compliance rate, cost, risks, and uncertainties surrounding these transition strategies have resulted in unintended resistance, despite the urgency and benefits of achieving net zero emissions. This study developed a compliance strategy that utilizes the PESTLE analysis factors to enhance adherence to net-zero transition regulations. The strategy monitors, evaluates, enforces, and encourages net-zero transition targets. Hence, it is imperative to adopt a collaborative approach that is more transparent and inclusive to facilitate the willingness to comply with the net zero transition regulations. These findings would guide relevant stakeholders and decision-makers with an improved compliance strategy towards net zero carbon emissions transition plans.

**Keywords:** Compliance; carbon emissions; net-zero transition; built environment.

## 1. Introduction

Reducing GHG emissions is a crucial step towards mitigating the effects of climate change on the built environment and stabilising global temperatures (Rogelj *et al.*, 2015; United Nations, 2015). Net-zero emission plans involve balancing out the GHGs produced in the built environment against the amount of GHGs taken out of the atmospheric temperature (Climate Council, 2023). GHGs comprise Carbon dioxide (CO<sub>2</sub>), Methane, Nitrous Oxide, Hydrofluorocarbons, Perfluorocarbons, Sulfur hexafluoride, Nitrogen trifluoride, water vapour, and Ozone (EIA, 2022). Accordingly, CO<sub>2</sub> is the most significant source of GHG emissions within the built environment, primarily triggered by human activities such as burning fossil

fuels for heating, transportation, and electricity generation (Davis *et al.*, 2018; EPA, 2023). According to (Liu *et al.*, 2022), the amount of CO<sub>2</sub> in the atmosphere is increasing rapidly, even though a temporary decline was recently observed during the Covid-19 lockdown period. In addition, the expansion of population growth, urbanisation, changes in household sizes, and industrialisation increases energy consumption which negatively contributes to the high intensity of carbon emissions, especially as economic growth continues to flourish (O'Neill *et al.*, 2010; Sohag *et al.*, 2015; Acheampong, 2018).

The Paris Agreement declared climate change a global emergency requiring international cooperation across all nations in search of solutions with a legally binding international treaty, adopted on December 12, 2015 and later enforced on November 4, 2016 (UNFCCC, 2016). Accordingly, all 196 parties involved in the Paris Agreement have set up different rules, regulations, and guidelines towards achieving the net zero emissions transition target to mitigate the impacts of climate change and institutionalise sustainability (UNFCCC, 2016). The United Nations stressed the need to limit global warming to 1.5 degrees Celsius by ensuring that the GHG emission will unconditionally reach its peak before 2025 to achieve a notable 43 per cent decline by 2030 within the built environment (Rogelj *et al.*, 2016; UNFCCC, 2016). According to Erickson and Brase (2019), reducing global warming to 1.5 degrees Celsius relative to pre-industrial temperature would limit climate change impacts to an endurable minimum catastrophic level.

Each nation's circumstances and the impacts of climate change are unique, which has led to the adoption of different targets, approaches and regulations for reducing GHG emissions. However, to achieve these targets within the built environment, it is crucial to implement effective compliance strategies that can incentivise individuals, companies, organisations, and countries to comply with the relevant regulations. These strategies should be tailored to ensure relevance and practicality, ultimately encouraging the transition to a low-carbon future (Duan *et al.*, 2014; Nwadike and Wilkinson, 2021). Many nations have expressed their challenges to comply with the net zero emission target because of their dependence on fossil fuels to meet their economic developments, making non-compliance a significant issue (Limmeechokchai *et al.*, 2022). The compliance strategies could include reducing the emission of GHGs, calculating and accounting for the amount of carbon emitted, and purchasing appropriate carbon credits that will enable the capacity to meet climate change targets. Accordingly, non-compliance with the emission regulations comes with consequences that are not favourable to the emitters, government entities, and the built environment (Duan *et al.*, 2014; Zhang, 2015). Considering the consequences of non-compliance and the associated challenges, exploring strategies for achieving compliance in the quest for a net zero emissions transition is imperative.

This study explores compliance strategies for achieving a net zero emissions transition across relevant stakeholders and parties contributing to or regulating carbon emissions to enhance the reduction of GHG emissions in the built environment. In line with the objectives of this study, an integrative literature review technique was adopted to gain insights into relevant compliance strategies for transitioning to net zero carbon emissions. The study findings would guide relevant stakeholders and decision-makers with an improved understanding of net zero carbon emissions transition plans worldwide.

### **1.1. Research objectives**

- To develop a compliance strategy to achieve a net zero emissions transition within the built environment.

- To provide innovative recommendations on encouraging compliance with net zero emissions regulations across the global built environment.

## **2. Climate change and greenhouse gas (GHG) emissions regulations**

Sustainable Development Goal (SDG) 13 stipulates urgent action to combat climate change and its impacts across four targets focusing on reducing GHG emissions. Accordingly, the United Nations declared climate change a global emergency with a legal international binding treaty to devise measures to save the planet under the Paris Agreement (UNFCCC, 2016). All the 196 parties that signed the Paris Agreement were tasked with the responsibility of creating regulations, national policies and strategies, and adaptation plans (UNFCCC, 2016). The Paris Agreement is a legally binding treaty that helps ensure transparency, accountability, commitment, and willingness within the member parties to accelerate reducing GHG emissions (Kennard, 2020; GWA, 2023). Accordingly, the treaty provided legislation globally that established different statutory requirements and policies across member parties directed towards net zero emissions to enhance climate resilience in the built environment (GWA, 2023). Considering the global geopolitical and environmental differences, no single climate change regulation can provide valuable guidelines and procedures to achieve GHG emissions targets; each party was encouraged to draft suitable and applicable regulations with implementation strategies (Nachmany et al., 2014).

This stringent climate change regulation and implementation are significant, especially as the United Nations real-time data indicates that GHGs in the atmosphere have reached a new high and may continuously increase globally (UNSD, 2022). Among the GHGs, CO<sub>2</sub> stays longer in the atmosphere and has the highest quantity released in the built environment, leading to an increase in ocean and land temperatures (Fair Supply, 2023). Hence, reducing CO<sub>2</sub> emissions into the atmosphere will significantly contribute towards achieving the net zero emissions target. In line with the climate change mitigation strategy through reducing GHG emissions, the Paris Agreement has provided a standardised GHG reporting protocol system that guides organisations, countries, and other entities to access, measure, and calculate the amount of CO<sub>2</sub> emitted within their respective operational activities (Wimbadi and Djalante, 2020; Fair Supply, 2023).

## **3. Compliance philosophy in net zero transitions**

The GHG emissions regulatory system demands absolute compliance to mitigate direct and indirect climate change catastrophic impacts in the built environment. Mitigating this impact requires immediate action backed by operative transition plans, willpower, and financial support (Deloitte, 2022). Above all, a successful mitigation strategy for GHG emissions involves a detailed regulatory system and enforceable compliance strategies. However, achieving a high level of compliance requires stakeholder's cooperation with the regulators, understanding the significance of the regulations, and the associated implementation strategies (Nwadike and Wilkinson, 2021). In the context of this study, 'compliance philosophy' refers to creating a culture that stimulates the willingness of organisations, companies, countries, and other related entities to fully comply with all GHG emissions regulations towards meeting their net-zero targets. Furthermore, meeting the compliance target requires commitment from the policymakers and the emitters combined with a sound understanding of all parties (Nwadike and Wilkinson, 2021). Accordingly,

the expectation of net zero transition is achievable through well-developed transition plans with implementation strategies (Deloitte, 2022).

Creating an excellent compliance environment would entail encouraging the inclusiveness of all relevant stakeholders where the opinion of both the regulators and the GHG emitters will count on the regulatory and compliance process (Lisa, 2010; Roshchanka and Evans, 2016; Nwadike and Wilkinson, 2021). The inclusiveness may initiate the involvement of regulators and GHG emitters in planning and formulating regulatory policies, dialogue engagement, and agreeable implementation strategies with actionable plans (Nwadike and Wilkinson, 2021). Engaging with GHG emitters is significant because all the relevant stakeholders come to the table with their respective diverse interests, meaning that inclusiveness and neutral dialogue reduces non-compliance while creating compliance values and cultures among the emitters of GHG emissions (Ahmed *et al.*, 2018; Nwadike and Wilkinson, 2021). In this study, a neutral dialogue means a deliberation void of any bias, where all parties' voices and viewpoints are considered. Achieving compliance with the net zero targets requires an action plan that incorporates the assessment of factors promoting and hindering compliance with an articulated solution agender comprising awareness, consultation, involvement, collaboration, and empowerment (Nwadike and Wilkinson, 2021). In addition, the net zero transition process helps identify and integrate compliance risks into a well-planned risk management framework aligned with the GHG transition plan (Deloitte, 2022). Hence, aligning compliance culture with incentives in a robust governance environment would facilitate net zero plans across the required strategies, plans, and risk management evaluation (Deloitte, 2022).

## 4. Research method

This study adopted a qualitative approach to gain insights into relevant compliance strategies for transitioning to net zero carbon emissions. An integrative literature review was conducted to evaluate the existing ideas and synthesise them to generate new perspectives using an in-depth analysis of key concepts to facilitate the assessment of the topic and construct novel knowledge (Torraco, 2016). The integrative literature review process consisted of problem formulation, literature search, data evaluation, data analysis, data interpretation, and presentation of research findings (Russell, 2005; Lubbe *et al.*, 2020). This research approach ensures that the study findings are incorporated into the existing literature to provide improved insights.

## 5. Results and discussion

This section delves into the various compliance strategies employed in net-zero emission transition plans within the built environment. The strategies used have been tried and tested to ensure a smooth transition towards net-zero emissions. Relevant recommendations and outcomes are also discussed in detail.

### 5.1. Compliance strategies towards net-zero emissions transition

To achieve a net-zero emissions transition in the built environment and reduce global warming, all actors in the value chain must collaborate on actionable plans (Patchell, 2018). Regulations that consider political, economic, social, technological, legal, and environmental (PESTLE) factors are necessary to ensure compliance with GHG emissions transition plans. Using the PESTLE factors as a data collection

instrument can create a comprehensive framework for successful and sustainable transitions towards lower emissions. The impact of these PESTLE factors is crucial in shaping government and emitter compliance responses towards net-zero transition plans. Effective compliance strategies require urgent action to address climate change impacts and balance GHG emissions. PESTLE factors are interrelated but not interchangeable, and any unresolved factor has the potential to trigger non-compliance with GHG regulations.

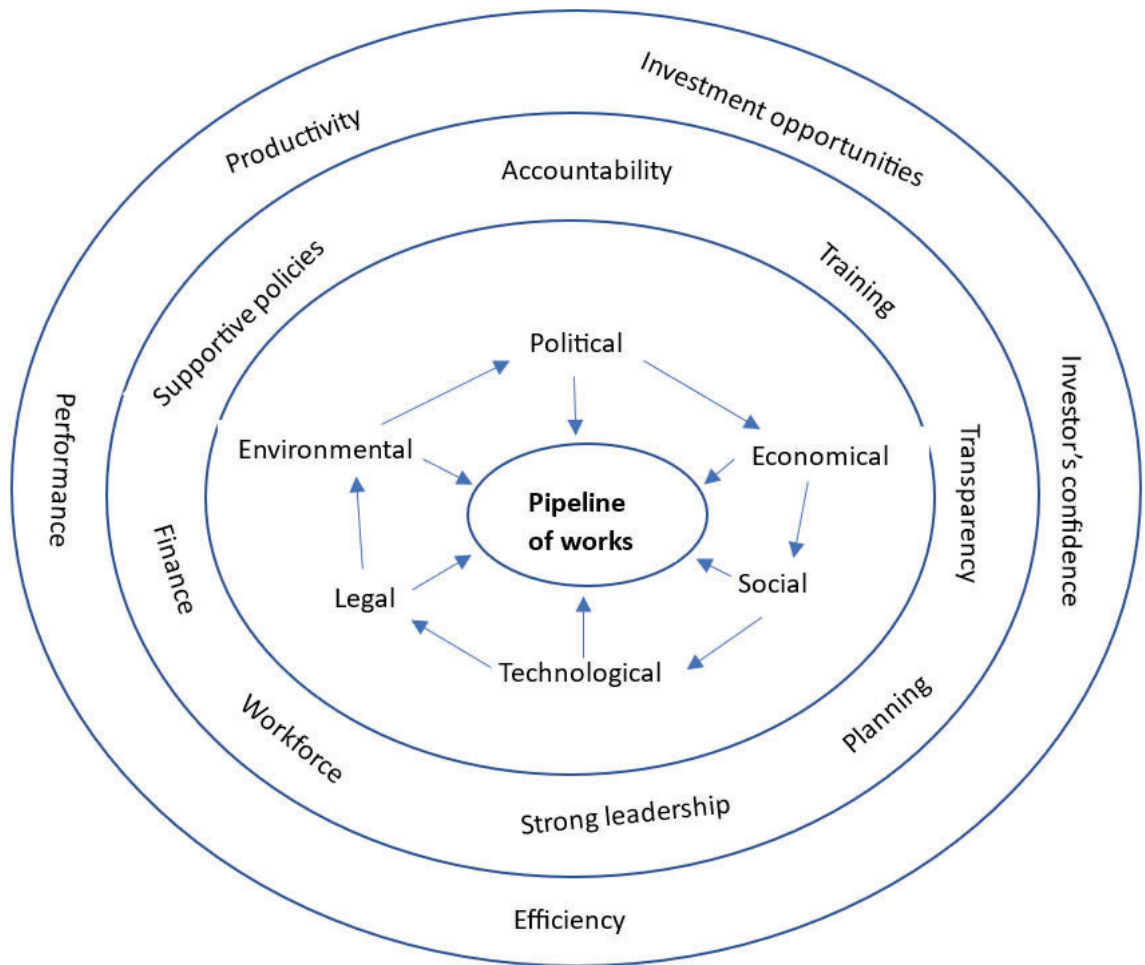


Figure 1: Compliance strategy concept.

In the context of this study, the PESTLE analysis provides a balancing tool to monitor, evaluate, analyse, enforce, and encourage effective compliance with global GHG emissions regulations towards achieving net-zero targets. Considering the significance of the PESTLE analysis, it offers strategic planning and decision-making tools that help to identify risk opportunities associated with the performance of compliance strategies towards net-zero transition plans in the built environment (Nicolette Bartlett *et al.*, 2016). These potential factors can influence a compliance process positively or negatively depending on the willingness of the government towards a net zero transition plan (Jordan *et al.*, 2022). For example, most of the political factors come from the government's roles in setting regulations, legislations, and implementable policies, as net zero emissions would require substantial government commitment and political will to enforce compliance (Jordan *et al.*, 2022; Dalirazar and Sabzi, 2023). Also, government policies shape and influence all internal and external policies across diverse organisations and the behaviour of the emitters towards complying with net-zero emissions (Brock *et al.*, 2022; Jordan *et al.*, 2022). Therefore, the government must legislate appropriate policies in conjunction with all relevant key players and stakeholders to make a sustainable compliance process that is favourable and implementable by all relevant parties (Nwadike and Wilkinson, 2021; Jordan *et al.*, 2022). Accordingly, Brock *et al.* (2022) believe that mandatory government policies geared towards net-zero emissions may reduce the consumption rate of emissions-generated goods and services and human activities, which may lead to less trading globally. However, changes in government, conflicts, and political elections may change countries' attitudes towards pushing for compliance with net zero emissions transition plans, mainly because politicians try to align and re-align their respective agendas while striving to secure re-election (Keefer, 2007).

Effective compliance strategies require viable economic growth and development capable of providing an enabling environment to finance the compliance process and allow GHG emitters to comply with the regulations willingly. The enabling economic environment should be devoid of weak financial schemes, high inflation and interest rates, and foreign exchange rates, among others (LOCO, 2018; Wang *et al.*, 2022). Wang *et al.* (2022) acknowledged that adverse economic shocks to the GDP may affect the level of compliance with carbon emissions regulations, especially where the laws guiding carbon emissions are strict. This signifies that developing nations may find it difficult to enforce compliance across GHG emitters towards achieving net-zero target. However, achieving compliance requires providing economic and non-economic incentives and reduced compliance cost to businesses, organisations, and entities that emits GHG (Nicolette Bartlett *et al.*, 2016). Societal influence maximally shapes individual behaviour towards complying with climate change policies and regulations geared towards reducing GHG emissions (Ela, 2009). The social influence may be difficult to quantify; however, it requires identifying how GHG emissions and their regulations may affect or better the value of people's life (Ela, 2009; Grayson and Robertson, 2020). This means maximum compliance may be achieved when the carbon emission targets and regulations align with the people's existing cultural values and norms.

Furthermore, Ela (2009) argued that any climate change policy that excludes the social influence in reducing carbon emissions may not be achieved. Hence, compliance with GHG emissions regulation is only effective when the compliance process and strategies are fully embedded in the socio-cultural values and norms of the people. The compliance strategy through socio-cultural values allows the people to view reasons for compliance through the lens of community structure, cultural trends, demographic, population, beliefs, and how climate change impacts may catastrophically affect their built environment (LOCO, 2018). This is necessary as social norms shape people's behaviour, and tailoring compliance

strategies of GHG emissions to align with social norms facilitates people's willingness to obey regulations while guiding policymakers and carbon emitters towards a net zero emissions target (Ela, 2009).

The application of technology in compliance is drastically changing, shifting, shaping, and disrupting the traditional methods of compliance, especially towards net-zero transition. The use of technology such as Artificial Intelligence (AI) and machine learning to achieve compliance with carbon emissions regulation comes with positive and negative influences that affect the entire compliance process (CIAL, 2023). Incorporating and implementing a technological system into the compliance strategy process may be able to forecast, analyse, evaluate, and monitor how business, companies, and organisations emit GHG and provide various measures towards its reduction while maintaining service efficiency (CIAL, 2023). According to Villegas-Palacio and Coria (2010), a well-embedded technological system for compliance reduces the violation rate of compliance principles and the benefits of non-compliance. Furthermore, placing the merits of technology application with the associated compliance complexities, it is advisable to ensure compliance officers are adequately trained as the technological system evolves around GHG (Nwadike and Wilkinson, 2021; 2022). Harnessing the potentials of technological advancements system requires aligning compliance strategies with the objectives of net-zero transition plans and integrating the resultant outcome into driving risk management (Deloitte, 2017).

Nonetheless, efficient compliance strategies anchored around a legal framework and the rule of law help to enhance compliance with the outlined regulations surrounding net-zero transition plans. This is because legal influence is utilised to set out punishments for any breach of the net-zero transition regulations while helping to regulate people's behaviour towards compliance (Barker *et al.*, 2001). The urgency of climate change action necessitates involving an active legal framework that enforces enacted GHG regulations known and acceptable by all parties (Gerrard, 2007). Environmental factors directly or indirectly affect the efficiency of compliance strategies in reducing GHG emissions in the built environment. However, the (OECD, 2009) reported that many Organisation for Economic Co-operation and Development (OECD) countries find it challenging to comply with the GHG environmental regulatory requirements. Embedding implementable environmental policies into actionable strategies that promote compliance with regulations towards reducing carbon emissions (Guo *et al.*, 2021).

Relevant compliance strategies to reduce GHG emissions require proactive and transparent accountability from the government regulatory agencies and the emitters across all sectors. This involves measuring and reporting all GHG emission activities. At the same time, the government provides supportive policies that can create an enabling environment with easy-to-understand guiding principles that will aid the measuring and reporting process. Effective utilisation of the guiding principles of measuring and reporting GHG emissions requires regular training on how to use GHG accounting tools, the significance of reporting, and various ways of minimising GHG in the built environment. Strong leadership in combating the challenges of reducing GHG emissions is necessary to ensure that stringent enforceable regulations are enacted with supportive policies that increase the emitter's willingness to account for their own GHG emissions. Accordingly, GHG regulators should provide accessible technical assistance as a compliance strategy to incentivise and increase compliance rates. However, providing financial incentives to alleviate the cost of compliance to some extent may help boost the compliance rate. Also, considering the urgency to reduce GHG emissions and the number of emitters in the built environment, it becomes imperative for the government to have functional assessors workforce with all the necessary knowledge and proper skills to assess and enforce compliance according to the established GHG emissions regulations. If well implemented, this compliance strategy may promote productivity,

attract local and international investors, boost investors' confidence, enhance efficiency, and increase system performance.

## 5. Conclusion

It has become widely acknowledged that a crucial step in combating the negative impacts of climate change on our built environment is based on achieving a net-zero transition in carbon emissions to avoid the unfavourable prevailing consequences of climate change. This study explored strategies to boost and promote compliance with carbon emissions regulations among the emitters while pushing towards achieving a smooth net-zero emissions transition. An integrative literature review provided insightful techniques to develop a compliance strategy capable of transitioning to net-zero emissions in the built environment while boosting the emitter's willingness to comply with carbon emissions reduction.

The study acknowledged the urgency of achieving the net-zero transition plans for carbon emissions and its profitability in safeguarding the built environment from the catastrophic climate change consequences. The findings from this study reveal that there are intended and mostly unintended non-compliance behaviour towards the carbon emissions reduction regulations, prompting the need for an active compliance strategy. The PESTLE analysis incorporated in compliance strategies provides a balance tool to monitor, evaluate, analyse, enforce, and encourage effective compliance to achieve net-zero transition targets. Also, the study findings show the inter-dependency of the PESTLE factors and their influential capacities in fostering compliance among the carbon emitters. It is crucial to consider all PESTLE factors when working towards carbon emission reduction and implementing the compliance strategy to avoid any potential setbacks or disruptions. This strategy's effectiveness relies on the government's willingness to make policies, regulate carbon emissions, enforce compliance and motivate the emitters to comply with carbon emissions regulations. This implies that a well-planned and implemented compliance strategy can drive carbon emissions regulations successfully through timely support policies and direct collaborative commitment between the government and the emitters. This necessitates proactive transparency and accountability from the government's carbon emitters and regulatory entities.

The research findings revealed how government policies and attitudes shape and influence CO<sub>2</sub> emitters' adherence to carbon emission protocols and regulations. Accordingly, adequate training of the emitters and the regulators is necessary as the environmental policies and technological innovations surrounding GHG emissions continue to evolve. Also, providing technical assistance to motivate and incentivise CO<sub>2</sub> emitters could significantly encourage and boosts their behaviours to meet the net-zero transition target by 2050. Although the net zero emission policies and responses may vary across countries, the time-based urgency on achieving climate change goal remains constant, as there are foreseeable environmental climate change impacts in the built environment. A limitation of this study is that it applied only an integrative literature review technique to drive the findings. Future research may consider incorporating a case study and interviews with subject matter experts to validate this study's recommended compliance strategies. Also, future research is recommended to critically analyse and justify how carbon offsetting and credit will help to reduce GHG in the atmosphere and meet the climate change targets in the built environment.

## 6. References:

- Acheampong, A. O. (2018) Economic growth, CO<sub>2</sub> emissions and energy consumption: what causes what and where?, *Energy Economics*, 74, 677-692.
- Ahmed, I., Gajendran, T., Brewer, G., Maund, K., von Meding, J. and MacKee, J. (2018) Compliance to building codes for disaster resilience: Bangladesh and Nepal, *Procedia engineering*, 212, 986-993.
- Barker, T., Kram, T., Oberthür, S. and Voogt, M. (2001) The role of EU internal policies in implementing greenhouse gas mitigation options to achieve Kyoto targets, *International Environmental Agreements*, 1, 243-265.
- Brock, A., Kemp, S. and Williams, I. D. (2022) Personal Carbon Budgets: A Pestle Review, *Sustainability*, 14(15), 9238.
- CIAL (2023) How Technology is Impacting the Future of Compliance. Available from: CIAL Dun & Bradstreet <<https://www.cialdnb.com/insights-resources/third-party-risk/how-technology-is-impacting-the-future-of-compliance/>> (accessed June 23).
- Climate Council (2023) What does Net Zero emissions means? Available from: Climate Council <<https://www.climatecouncil.org.au/resources/what-does-net-zero-emissions-mean/#:~:text=Net%20zero%20emissions%20refers%20to,taken%20out%20of%20the%20atmosphere.>> (accessed May 20, 2023).
- Dalirazar, S. and Sabzi, Z. (2023) Strategic analysis of barriers and solutions to development of sustainable buildings using PESTLE technique, *International Journal of Construction Management*, 23(1), 167-181.
- Davis, S. J., Lewis, N. S., Shaner, M., Aggarwal, S., Arent, D., Azevedo, I. L., Benson, S. M., Bradley, T., Brouwer, J. and Chiang, Y.-M. (2018) Net-zero emissions energy systems, *Science*, 360(6396), eaas9793.
- Deloitte (2017) Compliance modernization is no longer optional. Available from: Deloitte <<https://www2.deloitte.com/content/dam/Deloitte/us/Documents/regulatory/us-compliance-modernization.pdf>> (accessed June 28).
- Deloitte (2022) How Risk and Compliance functions can support the net zero transition: Investment Managers and net zero. Available from: Deloitte <<https://emearegulatorystrategy.deloitte.com/post/102hsrd/how-risk-and-compliance-functions-can-support-the-net-zero-transition-investment#:~:text=Credible%20net%20zero%20plans,-The%20credibility%20and&text=Risk%20and%20For%20Compliance%20can,%2Dsetters%2C%20and%20industry%20bodies.>> (accessed May 29, 2023).
- Duan, M., Pang, T. and Zhang, X. (2014) Review of carbon emissions trading pilots in China, *Energy & Environment*, 25(3-4), 527-549.
- EIA (2022) Energy and the environment explained: Greenhouse gases. Available from: U.S. Energy Information Administration <<https://www.eia.gov/energyexplained/energy-and-the-environment/greenhouse-gases.php>> (accessed May 21, 2023).
- Ela, J. S. (2009) Law and norms in collective action: Maximizing social influence to minimize carbon emissions, *UCLA J. Envtl. L. & Pol'y*, 27, 93.
- EPA (2023) Sources of Greenhouse Gas Emissions. Available from: United State <<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>> (accessed May 20, 2023).
- Erickson, L. E. and Brase, G. (2019) Paris agreement on climate change, in, *Reducing Greenhouse Gas Emissions and Improving Air Quality*, CRC Press, 11-22.
- Fair Supply (2023) An overview of carbon emissions, net-zero and decarbonisation. Available from: Fair Supply Analytics Pty Ltd <<https://fairsupply.com.au/carbon-emissions-net-zero-decarbonisation-overview/#accept-cookies>> (accessed May 29, 2023).
- Gerrard, M. (2007) Global climate change and US law, *American Bar Association*.
- Grayson, N. and Robertson, J. (2020) Considering social impacts in infrastructure business cases. Available from: Consult Australia <[https://www.consultaustralia.com.au/docs/default-source/pipeline/considering-social-impact.pdf?sfvrsn=e40986b8\\_2](https://www.consultaustralia.com.au/docs/default-source/pipeline/considering-social-impact.pdf?sfvrsn=e40986b8_2)> (accessed June 21).
- Guo, X., Fu, L. and Sun, X. (2021) Can environmental regulations promote greenhouse gas abatement in OECD countries? Command-and-control vs. market-based policies, *Sustainability*, 13(12), 6913.

- GWA (2023) Climate change legislation. Available from: Government of Western Australia <<https://www.wa.gov.au/service/environment/environment-information-services/climate-change-legislation>> (accessed May 26, 2023).
- Jordan, A., Lorenzoni, I., Tosun, J., i Saus, J. E., Geese, L., Kenny, J., Saad, E. L., Moore, B. and Schaub, S. G. (2022) The political challenges of deep decarbonisation: towards a more integrated agenda, *Climate Action*, 1(1), 6.
- Keefer, P. (2007) Clientelism, credibility, and the policy choices of young democracies, *American journal of political science*, 51(4), 804-821.
- Kennard, A. (2020) The enemy of my enemy: when firms support climate change regulation, *International Organization*, 74(2), 187-221.
- Limmechokchai, B., Pradhan, B. B., Chunark, P., Chaichaloempreecha, A., Rajbhandari, S. and Pita, P. (2022) Energy system transformation for attainability of net zero emissions in Thailand, *International Journal of Sustainable Energy Planning and Management*, 35, 27-44.
- Lisa, I. (2010) Compliance culture. A conceptual framework, *Journal of management and organization*, 19(7), 702-714.
- Liu, Z., Deng, Z., Davis, S. J., Giron, C. and Ciais, P. (2022) Monitoring global carbon emissions in 2021, *Nature Reviews Earth & Environment*, 3(4), 217-219.
- LOCO (2018) PESTLE ANALYSIS: of Barriers to Community Energy Development. Available from: Local Energy Communities <[https://leco.interreg-npa.eu/subsites/leco/PESTLE\\_Analysis\\_LECO\\_A4\\_190110-singlepages.pdf](https://leco.interreg-npa.eu/subsites/leco/PESTLE_Analysis_LECO_A4_190110-singlepages.pdf)> (accessed 2023).
- Lubbe, W., ten Ham-Baloyi, W. and Smit, K. (2020) The integrative literature review as a research method: A demonstration review of research on neurodevelopmental supportive care in preterm infants, *Journal of Neonatal Nursing*, 26(6), 308-315.
- Nachmany, M., Fankhauser, S., Townshend, T., Collins, M., Landesman, T., Matthews, A., Pavese, C., Rietig, K., Schleifer, P. and Setzer, J. (2014) The GLOBE climate legislation study: a review of climate change legislation in 66 countries.
- Nicolette Bartlett, Paul Begley, James Cole, Louise Driffill, Kayla Friedman, Tamara Inkster-Draper, Aris Vrettos, Eliot Whittington and Adele Williams (2016) A new climate for business. Available from: University of Cambridge Institute for Sustainability Leadership <<https://www.cisl.cam.ac.uk/system/files/documents/A-New-Climate-for-Business.pdf>> (accessed June 20).
- Nwadike, A. and Wilkinson, S. (2021) Promoting performance-based building code compliance in New Zealand, *Journal of Performance of Constructed Facilities*, 35(4), 04021032.
- Nwadike, A. and Wilkinson, S. (2022) Challenges facing building code compliance in New Zealand, *International Journal of Construction Management*, 22(13), 2493-2503.
- O'Neill, B. C., Dalton, M., Fuchs, R., Jiang, L., Pachauri, S. and Zigova, K. (2010) Global demographic trends and future carbon emissions, *Proceedings of the National Academy of Sciences*, 107(41), 17521-17526.
- OECD (2009) Ensuring environmental compliance—Trends and good practices. Available from: Organisation for Economic Co-operation and Development Publications Paris <<https://www.oecd.org/env/tools-evaluation/ensuringenvironmentalcompliance-trendsandgoodpractices.htm#:~:text=Ensuring%20Environmental%20Compliance%3A%20Trends%20and%20Good%20Practices,-Executive%20Summary%20%7C%20Contents&text=Despite%20progress%20in%20recent%20years,insufficient%20compliance%20with%20regulatory%20requirements.>> (accessed June 22).
- Patchell, J. (2018) Can the implications of the GHG Protocol's scope 3 standard be realized?, *Journal of cleaner production*, 185, 941-958.
- Rogelj, J., Den Elzen, M., Höhne, N., Fransen, T., Fekete, H., Winkler, H., Schaeffer, R., Sha, F., Riahi, K. and Meinshausen, M. (2016) Paris Agreement climate proposals need a boost to keep warming well below 2 C, *Nature*, 534(7609), 631-639.
- Rogelj, J., Schaeffer, M., Meinshausen, M., Knutti, R., Alcamo, J., Riahi, K. and Hare, W. (2015) Zero emission targets as long-term global goals for climate protection, *Environmental Research Letters*, 10(10), 105007.

222 - Compliance strategies towards achieving net zero carbon emissions transition in the built environment.

- Roshchanka, V. and Evans, M. (2016) Overview of stakeholders participation in adoption & implementation of building energy codes, Pacific Northwest National Laboratory (webinar). Accessed November, 22, 2019.
- Russell, C. L. (2005) An overview of the integrative research review, *Progress in transplantation*, 15(1), 8-13.
- Sohag, K., Begum, R. A., Abdullah, S. M. S. and Jaafar, M. (2015) Dynamics of energy use, technological innovation, economic growth and trade openness in Malaysia, *Energy*, 90, 1497-1507.
- Torraco, R. J. (2016) Writing integrative literature reviews: Using the past and present to explore the future, *Human resource development review*, 15(4), 404-428.
- UNFCCC (2016) The Paris Agreement: What is the Paris Agreement? Available from: United Nations Framework Convention on Climate Change (COP21) <<https://unfccc.int/process-and-meetings/the-paris-agreement#:~:text=What%20is%20the%20Paris%20Agreement%3F&text=The%20Paris%20Agreement%20is%20a,force%20on%20%20November%202016.>> (accessed May 22, 2023).
- United Nations (2015) For a livable climate: Net-zero commitments must be backed by credible action. Available from: United Nations <<https://www.un.org/en/climatechange/net-zero-coalition#:~:text=The%20coalition%20is%20growing.,every%20country%20in%20the%20world.>> (accessed May 20, 2023).
- UNSD (2022) Take urgent action to combat climate change and its impacts Available from: United Nations Statistics Division <<https://unstats.un.org/sdgs/report/2022/Goal-13/>> (accessed May 26, 2023).
- Villegas-Palacio, C. and Coria, J. (2010) On the interaction between imperfect compliance and technology adoption: taxes versus tradable emissions permits, *Journal of Regulatory Economics*, 38, 274-291.
- Wang, Y., Sharp, B., Poletti, S. and Nam, K.-M. (2022) Economic and land use impacts of net zero-emission target in New Zealand, *International Journal of Urban Sciences*, 26(2), 291-308.
- Wimbadi, R. W. and Djalante, R. (2020) From decarbonization to low carbon development and transition: A systematic literature review of the conceptualization of moving toward net-zero carbon dioxide emission (1995–2019), *Journal of cleaner production*, 256, 120307.
- Zhang, Z. (2015) Carbon emissions trading in China: the evolution from pilots to a nationwide scheme, *Climate Policy*, 15(sup1), S104-S126