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**ENSURING COMMUNITY BENEFITS FROM LARGE
ENERGY INFRASTRUCTURE PROJECTS**

JULY 2025

This report was commissioned by Cwmni Eginio to inform its work on maximising social, economic and environmental benefits from nuclear investment in Wales.

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EXECUTIVE SUMMARY

Infrastructure development plays a pivotal role in shaping the socio-economic landscape of regions, influencing various facets of community life, economic growth, and environmental sustainability. The uneven distribution of infrastructure, particularly in contexts like Ireland, highlights significant disparities that can lead to social exclusion and hinder equitable development across regions. Addressing these disparities is essential to ensure that all communities benefit from infrastructure investments, which are crucial for stimulating local economies and enhancing the quality of life for residents.

Stakeholder engagement is a critical component in the planning and execution of infrastructure projects. The involvement of local communities and other stakeholders in the decision-making process ensures that projects align with the specific needs and expectations of the populace. This participatory approach not only fosters transparency and accountability but also enhances public acceptance of projects, which is vital for their long-term success. Engaging communities early in the project lifecycle allows for the identification of potential social impacts and the development of mitigation strategies, thereby promoting a sense of ownership and active involvement among residents.

The study delves into the consequences of infrastructure projects on communities and explores methods to ensure communities reap the rewards of these investments. The study aims to achieve the following objectives: analyse the impact of infrastructure projects on communities by showcasing specific examples, explore the benefits that communities derive from nuclear investments, elucidate the goals and consequences of community benefit funds, and outline effective approaches to engage with communities and understand their needs. This study also provides several key principles and strategies that can enhance community engagement in infrastructure projects, with special emphasis on energy related projects.

RECOMMENDATIONS

1. Socially sustainable infrastructure requires a holistic approach, one that integrates community voices, distributes benefits fairly, and builds long-term resilience. By embedding these principles into planning and implementation, infrastructure projects can deliver not only economic value but also lasting social impact.
2. Infrastructure development should go beyond economic outcomes to prioritise social sustainability and community well-being. This requires early and continuous stakeholder engagement, particularly with local communities, to ensure that projects align with local needs and values. Transparent processes and equitable benefit-sharing are essential to maximise positive impacts and reduce potential harms.
3. A key recommendation is to embed social sustainability from the outset through comprehensive social impact assessments. These assessments should be conducted throughout the project lifecycle to anticipate and mitigate negative consequences. Community engagement must be treated as an ongoing, adaptive process rather than a one-off consultation, ensuring responsiveness to evolving community dynamics.
4. One effective mechanism for delivering community benefits is the use of Community Benefit Funds (CBFs). These funds, sourced from public or private entities, provide financial support for local development initiatives. CBFs can enhance health, education, infrastructure, and economic resilience, particularly in underserved or rural areas. They also support local entrepreneurship and job creation through community-based venture capital initiatives.
5. Beyond economic development, CBFs contribute to social cohesion by funding initiatives that foster community interaction, such as cultural events, sports programmes, and shared spaces. These activities strengthen social networks, improve mental well-being, and build a sense of belonging.
6. However, the success of CBFs depends on transparency, accountability, and meaningful community involvement in fund governance. Clear guidelines, equitable distribution, and regular evaluation are critical to ensuring that funds are used effectively and in line with community priorities.

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1. INTRODUCTION

- 1.01 This study examines the impact of infrastructure projects on communities and considers approaches to ensure communities benefit from such investments. The report was commissioned by Cwmni Eginio to inform its work on maximising social, economic and environmental benefits from nuclear investment in Wales.

Background

- 1.02 Infrastructure projects play a pivotal role in shaping the socio-economic landscape of communities. Their impacts can be multifaceted, influencing not only economic growth but also social dynamics, environmental conditions, and community well-being. Infrastructure development affects local populations, particularly in terms of social sustainability, economic access, and community cohesion.
- 1.03 Energy infrastructure projects often catalyse economic development within communities. For instance, Edomah et al. highlight that improved energy infrastructure can lead to enhanced access to essential services such as healthcare and education, thereby fostering economic growth and increasing demand for energy (Edomah et al., 2016). Similarly, Kumar et al. emphasise that sustainable planning and lifecycle thinking in energy infrastructure can drive economic benefits by creating jobs and stimulating local economies (Kumar et al., 2023). The establishment of energy projects can attract foreign direct investment, as noted by Ogunjobi et al., who argue that infrastructure supply is directly linked to economic growth in Nigeria (Ogunjobi et al., 2021). This relationship underscores the potential for energy infrastructure to act as a catalyst for broader economic development.
- 1.04 However, the social impacts of energy infrastructure projects are equally significant and often complex. Terrapon-Pfaff et al. discuss the social implications of large-scale infrastructure projects, noting that while such these can provide economic benefits, they also necessitate careful assessment to mitigate potential adverse effects on local communities (Terrapon-Pfaff et al., 2019). This sentiment is echoed by Hillman et al., who argue that neglecting social aspects during the design of energy infrastructure can lead to community resistance, ultimately jeopardising project sustainability (Hillman et al., 2021). The importance of engaging local communities in the planning and decision-making processes is crucial to ensure that their needs and concerns are adequately addressed.
- 1.05 The governance of energy infrastructure also plays a crucial role in shaping community outcomes. Monstadt's exploration of urban governance in Berlin illustrates how institutional changes and shifting energy policies can influence the sustainability of energy systems (Monstadt, 2007). Effective governance frameworks that incorporate stakeholder engagement and transparency are essential for fostering community trust and ensuring that

energy projects align with local priorities.

- 1.06 Moreover, the visual impact of low carbon energy infrastructure can affect public perception and acceptance. Beer et al. emphasise the importance of assessing the visual implications of energy projects, as negative perceptions can hinder their deployment (Beer et al., 2023). Engaging communities in discussions about the aesthetic aspects of energy infrastructure can facilitate greater acceptance and support for such initiatives.

Objectives

- 1.07 The main objectives of this study can be summarised as follows:
- Identify examples of infrastructure projects impact on communities,
 - Consider how communities benefit from nuclear investment,
 - Explain the objectives and impact of community benefit funds,
 - Identify approaches to best engage with communities to identify their needs.

Overview

- 1.08 The report consists of six sections:

Section 1 introduces this report.

The method used to identify examples of infrastructure projects impact on communities is described in Section 2.

Section 3 presents the results of the literature search through nine case studies.

Section 4 summarises the findings of the case studies.

Section 5 outlines the how communities could benefit from nuclear infrastructure projects and the role of community benefit funds in delivering benefits to communities.

Based on the literature reviewed in all sections, recommendations are made in Section 6.

2. IDENTIFYING THE IMPACT OF INFRASTRUCTURE PROJECTS ON COMMUNITIES

- 2.01 The potential benefits of nuclear investment in north Wales for local communities are multifaceted, encompassing economic, environmental, and social dimensions. As the region seeks to transition to a low-carbon economy, nuclear energy emerges as a pivotal player in addressing the energy gap and mitigating climate change. Communities can leverage nuclear investment to foster economic growth, enhance energy security, and promote social cohesion.
- 2.02 Firstly, nuclear investment can significantly stimulate local economies. The construction and operation of nuclear power plants create numerous job opportunities, both directly and indirectly. For instance, the Hinkley Point C project is expected to generate thousands of jobs during its construction phase, with estimates suggesting that it will create around 25,000 job opportunities, including apprenticeships and training programs for local residents (Jenkins et al., 2017). This influx of employment not only boosts local income levels but also enhances the skill sets of the workforce, contributing to long-term economic resilience (Alem et al., 2020). Furthermore, the presence of a nuclear facility can attract ancillary businesses and services, thereby broadening the economic base of the community (Zhu et al., 2016).
- 2.03 In addition to direct employment benefits, nuclear investment can lead to increased public revenues through taxation. Local governments can benefit from higher tax revenues generated by the nuclear facilities, which can be reinvested into community services such as education, healthcare, and infrastructure development (Glasson, 2017). Such financial resources are crucial for enhancing the quality of life for residents and can help address local needs more effectively. Moreover, the economic stability provided by nuclear investment can mitigate the adverse effects of economic downturns, offering a buffer against unemployment and financial insecurity (Chang et al., 2014).
- 2.04 The environmental benefits of nuclear energy also play a critical role in community development. As Wales aims to reduce its carbon emissions significantly, nuclear power presents a low-carbon alternative to fossil fuels, which are major contributors to climate change (Goodfellow et al., 2015). By investing in nuclear energy, communities can participate in the broader goal of achieving sustainability and environmental stewardship. This transition not only helps in meeting national climate targets but also enhances local air quality, reducing health risks associated with pollution from traditional energy sources (Bodel et al., 2021). The potential for nuclear energy to provide a stable and reliable power supply further supports community resilience against the backdrop of climate change (Peoples, 2014).
- 2.05 Moreover, nuclear investment can foster energy security at the community level. Wales's

increasing reliance on imported fossil fuels poses risks related to energy price volatility and supply disruptions (Elnokaly & Martin, 2014). By diversifying the energy mix to include nuclear power, communities can enhance their energy independence and stability. This is particularly important in the context of geopolitical uncertainties that can affect energy supply chains (Jones et al., 2013). The construction of a nuclear power plant also improves the local energy infrastructure (e.g. cables taking the energy away) and provides an opportunity for local communities to manage their own energy resources (Roberts et al., 2018).

- 2.06 Social cohesion is another significant benefit that can arise from nuclear investment. Engaging local communities in the planning and decision-making processes related to nuclear projects fosters a sense of ownership and responsibility among residents (Whitton et al., 2016). This participatory approach can help mitigate opposition to nuclear developments, which has historically been a challenge in the UK (Li et al., 2016). By involving communities in discussions about the benefits and risks associated with nuclear energy, stakeholders can build trust and enhance public acceptance of nuclear projects (Beelitz & Merkl-Davies, 2019). Furthermore, community benefits agreements, which outline specific commitments from nuclear developers to local communities, can ensure that the economic gains from nuclear investment are equitably distributed (Glasson, 2017).
- 2.07 The educational and training opportunities associated with nuclear investment can also contribute to social development. As nuclear facilities require a highly skilled workforce, local educational institutions can collaborate with nuclear operators to develop tailored training programs that equip residents with the necessary skills for employment in the nuclear sector (Stamford & Azapagic, 2012). This not only enhances the employability of local individuals but also fosters a culture of continuous learning and innovation within the community (Azapagic, 2012). Additionally, the presence of a nuclear facility can inspire interest in STEM (science, technology, engineering, and mathematics) fields among young people, thereby contributing to the development of a future-ready workforce (Spence et al., 2010).
- 2.08 Furthermore, the long-term commitment to nuclear energy can lead to sustained community development initiatives. As nuclear facilities often have operational lifespans of several decades, the economic and social benefits can be realised over an extended period (Bodel et al., 2021). This stability allows communities to plan for the future with greater confidence, enabling them to invest in long-term projects that enhance local infrastructure and services (Skea et al., 2013). The predictability of nuclear energy production can also support local businesses by providing a stable energy supply, which is essential for manufacturing and other energy-intensive industries (Doyle, 2011).

Literature review search strategy

- 2.09 In order to present a comprehensive and contemporary analysis of evidence, this report

adopts the systematic literature review approach to compile findings from primary studies. The systematic method employed in this report ensures comprehensive, transparent, and replicable results through a pre-specified search methodology. The following details the step-by-step process used to carry out the search and extract relevant results. It encompasses different elements, including sources to search, the search terms employed, the screening process to identify relevant evidence, and the approach used to extract and evaluate information from the literature that was screened.

Sources to search

- 2.10 Web of Science and Google Scholar were chosen as the sources to search for published academic and grey literatures. With their collective coverage, these academic databases serve as the main sources for academic literature, including journal articles and book series. As opposed to academic databases, Google Scholar offers a broader scope of sources, including conference proceedings and books not found elsewhere, making it a good source to search for grey literature.

Terms

- 2.11 Relevant keywords and their variants were used to gather academic and grey literatures from international evidence published. The language of published literature is limited to English.
- 2.12 The themes identified and their variants are implemented through the following search command in each academic database:

(TITLE-ABS-KEY (country) AND TITLE-ABS-KEY (infrastructure OR investment OR "economic development" OR "social value") AND TITLE-ABS-KEY (AND TITLE-ABS-KEY (infrastructure OR investment OR "economic development" OR "social value") AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "ENER")))

The search is performed for each country/ region which the Welsh Government has signed a Memoranda Of Understanding or has been identified as a priority international country/ region.¹ In addition, other countries / regions that share similar socio-economics characteristics. Examples of variants for *Infrastructure* include: energy, nuclear, transport, water, roads, railway.

- 2.13 Proximity searching and truncation techniques were utilised where appropriate.

¹ See <https://www.gov.wales/sites/default/files/publications/2020-10/international-strategy-for-wales-v1.pdf>

Screening

- 2.14 Merging these sets of results, 586 unique publications were identified in total. The screening process involves reviewing this pool of literature to identify able to address the objectives of this report.

3. ASSESSING THE IMPACT OF INFRASTRUCTURE ON COMMUNITIES

- 3.01 Infrastructure projects exert a substantial influence on communities, affecting diverse facets of social, economic, and environmental welfare. The execution of infrastructure projects, such as the development of roads, water supply systems, and energy facilities, has the potential to bring about significant changes in communities (Adugbila et al., 2022a). Implementing these projects brings about changes that extend beyond the physical landscape and influence the social structure of the areas. As a case in point, road infrastructure projects can affect the dynamics of social interactions, commuting, and service accessibility within a community (Khanani et al., 2020a). However, the effects of infrastructure projects extend beyond the physical realm; they also have social implications that can either enhance or disrupt community cohesion and well-being (Landauer & Komendantova, 2018).
- 3.02 An essential element of infrastructure projects lies in their capacity to drive economic growth in local communities. Investing in infrastructure, such as transportation networks and utilities, has the potential to attract businesses, generate job opportunities, and foster economic growth. The projects have a crucial role in enriching the socio-spatial landscapes and promoting economic development, with significant effects on social groups and community dynamics (Khanani et al., 2020a). Infrastructure projects have the potential to enhance the general welfare of residents through the provision of crucial services such as water supply, electricity (Gbadegesin et al., 2020).
- 3.03 Despite the many benefits that infrastructure projects offer to communities, they also give rise to challenges that demand attention. For large-scale projects, particularly those involving the extraction of natural resources, there is a potential for conflicts to arise concerning land use and resource ownership (Landauer & Komendantova, 2018). Infrastructure projects, when deployed, might encroach upon land rights, erode cultural practices, and disrupt traditional livelihoods, causing social tensions and protests within the communities affected (Landauer & Komendantova, 2018). In order to secure lasting benefits for communities, project planners and policymakers must carefully evaluate the long-term affects of infrastructure projects on social relations and environmental sustainability Clelland (2021).
- 3.04 In order to meet the needs and preferences of local residents, it is essential to promote community involvement and engagement in infrastructure development. The involvement of the community can play a significant role in identifying essential social values and enablers that are vital for the success and long-term viability of infrastructure projects (Ojuri et al., 2023). Involving the wider community in the planning and execution of infrastructure initiatives can cultivate a sense of ownership and guarantee that projects are in harmony with the social and cultural essence of the community (Ojuri et al., 2023). The engagement

of local residents in decision-making processes can effectively tackle concerns, alleviate resistance, and foster widespread acceptance of infrastructure projects within communities (Ge et al., 2020).

- 3.05 Infrastructure projects also have ramifications for social sustainability and governance within communities. The achievement of infrastructure projects necessitates the implementation of efficient governance frameworks that foster community involvement, transparency, and accountability (Blanchard & Hooijmaaijers, 2021). Implementing community-based governance models can contribute to the long-term sustainability of infrastructure assets and ensure their ability to adapt to the changing needs of the population (Gbadegesin et al., 2020). Through the cultivation of social capital and implementing collaborative design strategies, communities can utilise infrastructure projects to strengthen social bonds, improve service provision, and enhance overall well-being (Bowen, 2009).
- 3.06 The magnitude of infrastructure projects profoundly affects communities, prompting a diverse array of sentiments and reactions. These projects, often characterised as complex and time-consuming undertakings allowed by governments and involving a multitude of stakeholders, can give rise to both positive and negative consequences (Masrom et al., 2015). According to Nweke-Eze (2024), certain community leaders' support or opposition to these projects may be influenced by their vested interests, while others view them as chances for socio-economic development.
- 3.07 The societal understanding and approval of large-scale infrastructure projects are essential for their sustainable development and overall achievement (Mitoula & Papavasileiou, 2023). The perception of the public towards these projects exhibits a wide range of opinions. Some view them as helpful for enhancing living standards and empowering communities, while others express apprehension about potential adverse effects on biodiversity and ecosystems (Hasan & Ghosh, 2020). Including communities in the development process, for example through implementing Community Education Committees, can promote a sense of ownership and active involvement in infrastructure projects (Kamau et al., 2021). The assessment of public opinion, particularly on social media platforms, has gained greater importance in evaluating infrastructure projects (Yao, 2023).
- 3.08 Understanding community perceptions and effectively addressing challenges necessitate the analysis of public sentiment towards large infrastructure projects (Jiang et al., 2016). Studies have shown that public sentiment can evolve over time, with initial scepticism or opposition potentially shifting towards more positive views as projects progress (Mokashi et al., 2022). For example, implementing road infrastructural projects, despite their significance, has the potential to foster social disunity in specific areas, underscoring the need for meticulous planning and extensive community participation (Adugbila et al., 2022b). The provision of sufficient budgetary allocation and the adoption of inclusive planning processes play a

critical role in ensuring that infrastructure projects effectively address the needs of all citizens, particularly those from vulnerable and marginalised communities (Yang et al., 2023).

- 3.09 Effective communication management helps to enhance the performance of infrastructure project managers and nurturing positive relationships among the government, project stakeholders, and communities affected by infrastructure projects (Lubis, 2021). Prioritizing sustainability objectives in major infrastructure projects is essential for ensuring long-term environmental and social benefits (Li et al., 2018). The decision-making procedures concerning extensive infrastructure projects entail intricate choices and compromises, causing meticulous examination of diverse viewpoints and potential consequences (Sartzetaki, 2019).
- 3.10 By assessing the social sustainability contribution of infrastructure projects amidst uncertainty, it is possible to prioritise actions and enhance decision-making processes (Sierra et al., 2017). Through the utilisation of sentiment analysis and active engagement with public perspectives, governments and project managers can identify opportunities for enhancement and improve the overall quality of infrastructure projects (Pratiwi, 2023). Ultimately, comprehending and addressing public sentiment regarding major infrastructure projects is crucial for the advancement of sustainable development, the cultivation of positive relationships, and the enduring prosperity of these endeavours.
- 3.11 In conclusion, infrastructure projects have a multifaceted impact on communities, as they shape their social, economic, and environmental dynamics. Although these projects bring forth prospects for economic development, improved services, and enhanced connectivity, they also give rise to challenges pertaining to social disruption, environmental impact, and community resistance. In order to optimise the favourable effects of infrastructure projects on communities, it is imperative to give priority to community involvement, tackle social values, and endorse sustainable governance practices. Through the careful consideration of the social implications of infrastructure development and the promotion of inclusive decision-making processes, stakeholders can guarantee that projects effectively contribute to the well-being and prosperity of the communities they are intended to serve.

Case study A – The Basque country

- a.1 Various studies have showed that infrastructure projects in the Basque country have substantial socio-economic implications. Atapattu (2019) has provided ample evidence supporting the relationship between infrastructure investment and economic growth. This connection holds great importance because of its ability to enhance productivity across various sectors by enabling market transactions and fostering collaboration among firms and industries, as noted by Démurger (2001). Evidence suggests that infrastructure development has a direct and indirect impact on promoting positive economic development (Sreenu, 2021). The development of infrastructure, especially in regions with a history of underdevelopment, can have a crucial impact on reducing regional inequalities and fostering economic growth (Jiang et al., 2011).
- a.2 In the context of the Basque country, the effects of infrastructure projects transcend the mere economic aspects. For example, the development of high-speed rail systems has been suggested as a means of promoting nation-building through the economic integration of regional areas and improved connectivity (García-Mejuto, 2021). This integration is essential for fostering a sense of unity and shared identity within the region. By investing in infrastructure, governments can create a conducive environment for businesses to thrive, leading to overall economic development.
- a.3 The literature has also emphasised the significance of infrastructure in fostering regional competitiveness. The role of transportation infrastructure in improving accessibility and connectivity is crucial for enhancing competitiveness (Khusaini, 2022). Through implementing strategic and efficient transportation infrastructure, places such as the Basque country can enhance their overall competitiveness. Research has showed that the development of infrastructure has a favourable effect on sustainable economic growth (Mubin, 2019). This highlights the enduring advantages that strategic infrastructure investments can offer to a particular area.
- a.4 In regions such as the Basque country, where challenges like terrorism have had an impact on economic growth, infrastructure projects can play a pivotal role in facilitating recovery and promoting growth. The economic costs of conflict underscore the significance of investing in infrastructure to mitigate the adverse effects of events (Abadie & Gardeazábal, 2003). Through prioritising infrastructure development, regions can effectively counteract the negative affects of conflicts or crises, while simultaneously striving to revive their economies.
- a.5 The implementation of infrastructure projects within the Basque country carries considerable social implications capable of shaping communities and societies. The range of projects, which includes public infrastructure works and road and urban transport projects, has a significant impact on shaping the social structure of the region. The societal significance of

these initiatives lives in their capacity to deliver vital services, stimulate economic growth, generate job prospects, and enhance overall well-being through improved accessibility to essential amenities and reduced travel durations (Carrión-Barco, 2024). The execution of infrastructure projects may cause social disintegration, where alterations in social frameworks can affect societal dynamics (Adugbila et al., 2022b).

- a.6 The evaluation of the societal implications of infrastructure projects is crucial in guaranteeing their efficacy and durability. Research has indicated that infrastructure projects not only enhance economic prosperity but also support a range of social interventions and facilitate increased engagement in sociopolitical processes . Furthermore, the efficacy of infrastructure initiatives, specifically toll road projects, is intricately linked to their capacity to generate value for the community they cater to (Rohman et al., 2017). This emphasises the significance of taking the societal viewpoint into account during the planning and implementation of infrastructure projects.
- a.7 Infrastructure projects such as road developments can yield favourable outcomes on a regional scale by diminishing travel time and enhancing accessibility; however, they can also result in adverse social effects at the local level (Vijayakumar et al., 2022). It is imperative to perform diligent social impact assessments prior to and throughout the execution of such ventures in order to identify and rectify any potential detrimental impacts on communities. The involvement of stakeholders, including the public, in the decision-making process is crucial to ensure that infrastructure projects align with the community's expectations and needs (Susanto, 2019).
- a.8 The social sustainability of infrastructure projects is a key consideration in their planning and execution. Infrastructure agencies must review economic, environmental, and social parameters during the planning stage to ensure that projects contribute positively to social development, economic growth, and livelihood improvement (Alaloul et al., 2021). Neglecting the social dimension during infrastructure development can harm both the project and society, emphasising the importance of integrating social impact assessments into project planning (Mitoula & Papavasileiou, 2023).
- a.9 In the context of social infrastructure projects, the capabilities of project owners play a critical role in ensuring the success of operations. The interaction between project owners and end-users is essential for the effective functioning of social infrastructure projects, where the social process with final users is as important as the infrastructure works themselves (Gulino et al., 2020). Stakeholder engagement is another crucial aspect of infrastructure projects, as it helps in identifying opportunities to provide social value and wider benefits beyond the project's technical and economic aspects (Fitton & Moncaster, 2022).
- a.10 The social impact of infrastructure projects extends beyond physical structures to influence

the lives of individuals and communities. By framing social sustainability in infrastructure theory and practice, neighbouring communities and end-users of infrastructure services are all affected by these projects (Treviño-Lozano, 2022). Understanding stakeholders' influence on the social performance of infrastructure projects is essential for evaluating and managing their social affects effectively (Doloi, 2012). Incorporating environmental and social considerations alongside traditional project management aspects is becoming increasingly important in the infrastructure industry (Siew et al., 2013).

Case study B – Brittany

- b.1 Infrastructure projects in Brittany, like in many other regions, have significant socio-economic impacts. These projects play a crucial role in enhancing community development and improving socio-economic conditions (Hussain et al., 2022). The implementation of infrastructure projects creates opportunities for sustainable economic growth, business improvement, and increased social attractiveness of the region (Yurieva et al., 2021). Such projects are essential for meeting socio-economic requirements while also considering environmental conservation (Nweke-Eze, 2024).
- b.2 The implementation of green infrastructure in coastal areas introduces a new approach that considers ecological, socio-economic, and political factors to ensure sustainable development and resilience (Chávez et al., 2020). However, challenges such as project cost overruns and schedule delays in infrastructure procurement can have damaging economic effects, leading to inefficiencies, disputes, and project failures (Gbahabo & Ajuwon, 2017).
- b.3 Infrastructure projects in Brittany, like in many other regions, have profound social affects that can shape communities and individuals in various ways. These projects, ranging from road construction to energy infrastructure development, have been recognised for their ability to provide essential services, boost economic growth, create employment opportunities, and improve the overall quality of life (Carrión-Barco, 2024). However, it is crucial to acknowledge that while these projects bring about many benefits, they can also have negative repercussions at the local level, such as disruptions to communities, changes in land use patterns, and environmental degradation (Vijayakumar et al., 2022).
- b.4 One critical aspect highlighted in the literature is the importance of community involvement and support in infrastructure projects, particularly in energy-related initiatives. Engaging with the community early in the project lifecycle can help identify and analyse the potential social affects, allowing for better planning and mitigation strategies to be put in place (Hasan & Ghosh, 2020). This early consultation process is essential for understanding the anticipatory affects of the proposed project and ensuring that the concerns and needs of the local population are considered.
- b.5 Stakeholder engagement is another key factor in determining the social performance of infrastructure projects. Assessing stakeholders' influence through social cost-benefit analysis has become a mandatory practice in many countries to evaluate the social costs and benefits of business decisions (Doloi, 2012). By involving stakeholders in the decision-making process, infrastructure projects can better address the diverse needs and concerns of the community, leading to more socially sustainable outcomes.
- b.6 The social effects of infrastructure projects, such as dams, are often assessed by practitioners using various frameworks. These assessments are crucial for understanding

the broader implications of such projects on communities, ecosystems, and social structures (Kirchherr & Charles, 2016). By employing robust assessment methodologies, project planners can expect and address potential social challenges, ensuring that the projects align with the values and well-being of the affected populations.

- b.7 One challenge highlighted in the literature is the lack of open data standards for large infrastructure projects, which can hinder social-ecological research and monitoring efforts, particularly in environmentally sensitive regions (Hyde, 2024). Access to comprehensive and high-quality project data is essential for studying and mitigating the social and environmental effects of infrastructure developments, emphasising the need for transparency and data sharing in project planning and implementation.
- b.8 The concept of social value in infrastructure projects has gained prominence in recent years, emphasising the importance of going beyond technical and economic considerations to deliver wider societal benefits (Fitton & Moncaster, 2022). By incorporating social value assessments into project planning and evaluation, infrastructure projects can better address the social needs and aspirations of the communities they serve, leading to more inclusive and sustainable outcomes.
- b.9 In the context of mega infrastructure projects, neglecting the social dimension during development can have detrimental effects on both the project and society at large (Mitoula & Papavasileiou, 2023). Therefore, it is essential for infrastructure agencies to consider the economic, environmental, and social dimensions of projects from the planning stage onwards, ensuring holistic and sustainable outcomes (Alaloul et al., 2021).

Case study C – Flanders

- c.1 Infrastructure projects in Flanders have significant socio-economic affects that are well-documented in academic literature. The prevailing belief in economic circles is that substantial investments in infrastructure are pivotal for fostering economic growth (Ansar et al., 2016). This notion is exemplified by the Government of Flanders, which started various Public-Private Partnership (PPP) programs across sectors as education, healthcare, and transportation (Willems et al., 2017). Such initiatives not only enhance the physical infrastructure but also contribute to the overall economic development of the region.
- c.2 Studies have shown that infrastructure development, including aspects like rural electrification, water supply, and road construction, plays a crucial role in improving educational attainment, creating business opportunities, and boosting income levels (Riva et al., 2018). These improvements subsequently lead to increased affordability of utilities, higher electricity demand, and more investments in rural electrification, showcasing a positive cycle of socio-economic growth spurred by infrastructure projects.
- c.3 Implementing infrastructure projects not only catalyses economic growth but also enhances the business environment and social appeal of a region (Yurieva et al., 2021). Public construction projects, specifically in rural areas, are recognised as fundamental tools for improving socio-economic conditions and fostering community development (Hussain et al., 2022a).
- c.4 Information infrastructure is also acknowledged for its positive affects on socio-economic development in various nations (Meso et al., 2009). The provision of high-quality infrastructure attracts sophisticated economic activities, while inadequate infrastructure can hinder economic progress (Filion & Keil, 2016). Large-scale infrastructure projects have far-reaching socio-economic implications that extend beyond the immediate project sites, influencing economic activities and development in surrounding areas (Zhu et al., 2022).
- c.5 Infrastructure projects are crucial for regional economic security and play a vital role in the functioning and development of economies (Fedulova et al., 2020). The resilience of critical urban infrastructures is increasingly being assessed to ensure their sustainability and ability to withstand high-impact events that could affect socio-economic well-being (Urbina & Oscar, 2023). Efficient infrastructure provision is closely tied to socio-economic development, as evidenced by comparisons between transport and energy sectors in China (Rabe et al., 2020).
- c.6 Social sustainability is a key aspect of infrastructure projects, with research indicating that they promote economic well-being, complement social interventions, and facilitate participation in sociopolitical processes (Sierra et al., 2017). Neglecting the social dimension during infrastructure development can harm both the project and society as a whole (Mitoula

& Papavasileiou, 2023). Stakeholder engagement and understanding the social value of infrastructure are essential for the success of such projects (Gulino et al., 2020). Assessing the social impacts of major urban transport-infrastructure projects is crucial for ensuring the equitable distribution of benefits and costs among the affected communities (Mottee & Howitt, 2018).

- c.7 In the context of mega infrastructure projects, their construction and operation can significantly boost national productivity, promote economic development, and create employment opportunities, positively affecting the social fabric of the region (Chen et al., 2020). However, it is crucial to assess stakeholders' influence on the social performance of infrastructure projects to ensure accurate understanding and value creation for the public (Doloi, 2012). The success criteria of infrastructure projects, particularly toll road projects, are often measured based on factors associated with social benefits, highlighting the importance of considering societal perspectives in project evaluations (Rohman et al., 2017).
- c.8 Furthermore, life cycle assessments and cost analyses are recommended for infrastructure projects to review their economic, environmental, and social impacts during the planning stages (Alaloul et al., 2021). Accessible and high-quality data about infrastructure projects are essential for monitoring and studying their social and environmental implications, emphasising the need for open data standards in large-scale projects (Hyde, 2024). Additionally, the collaboration mechanisms in Public-Private Partnership (PPP) projects play a crucial role in promoting sustainable development and enhancing social capital in various regions (Yurieva et al., 2021).

Case study D – New Zealand

- d.1 Infrastructure projects in New Zealand have significant socio-economic impacts that are crucial for the country's development. These projects play a vital role in driving economic growth, improving the quality of life for residents, and fostering community development. Research by Grimes (2010) highlights the importance of infrastructure investment in New Zealand's economic development, emphasising the need to examine the impacts of such investments comprehensively. Infrastructure projects not only contribute to economic growth but also have far-reaching effects on various aspects of society.
- d.2 One key aspect of infrastructure projects in New Zealand is the adoption of innovative procurement techniques, such as Public-Private Partnerships (PPPs), as discussed by Liu & Wilkinson (2011a). These procurement methods are driven by factors like better risk allocation, cost savings, improved service quality, and benefits for local economic and social development. By leveraging innovative solutions tailored to the country's specific needs, New Zealand can overcome obstacles and maximise the benefits of infrastructure projects.
- d.3 Moreover, the socio-economic impacts of infrastructure projects extend beyond just economic considerations. Public construction infrastructure projects, as highlighted by Hussain et al. (2022b), are essential tools for enhancing community socio-economic conditions and fostering overall community development. These projects have the potential to improve the quality of life for residents by providing better health services, enhancing safety, creating economic opportunities, and promoting leisure activities.
- d.4 Infrastructure projects in New Zealand are also influenced by factors such as leadership styles (Witton et al., 2019). Understanding how leadership styles impact project outcomes, especially in post-disaster recovery projects, is crucial for ensuring the successful implementation of infrastructure initiatives. Effective leadership can drive project success and mitigate challenges that may arise during the project lifecycle.
- d.5 The impact of client characteristics on collaborative infrastructure projects provides valuable insights for the infrastructure sector in New Zealand (Manley & Chen, 2016). By understanding how client characteristics influence project performance, stakeholders can tailor their approaches to ensure successful project delivery. Collaboration in infrastructure projects is essential for achieving optimal outcomes and maximising the socio-economic benefits for the community.
- d.6 Additionally, the legal aspects of social infrastructure in New Zealand shed light on the broader scope of infrastructure projects in the country (Drobež & Bogataj, 2022). Social infrastructure encompasses various elements beyond physical structures, including public administration buildings, judiciary facilities, and transportation routes. Recognising the legal framework surrounding social infrastructure is crucial for ensuring the effective planning and

implementation of projects that cater to the diverse needs of the population.

- d.7 Infrastructure projects in New Zealand have significant social impacts that extend beyond the physical structures themselves. The social implications of infrastructure developments are crucial in the context of sustainable development, emphasising the need for thorough evaluation beyond mere subjective judgments (Rohman et al., 2017). Social cost-benefit analysis (SCBA) plays a vital role in assessing the social costs and benefits of infrastructure projects, ensuring that decisions are made with a comprehensive understanding of their impact on society (Doloi, 2012). This approach is particularly relevant in New Zealand, where the adoption of innovative procurement techniques, such as Public-Private Partnerships (PPPs), is driven by factors like improved quality of services, economic development, and social benefits (Liu & Wilkinson, 2011b).
- d.8 Infrastructure projects in New Zealand are not just about constructing physical assets; they hold intrinsic social value by providing essential services, boosting economic growth, creating employment opportunities, and enhancing the overall quality of life for communities (Carrión-Barco, 2024). The longevity of infrastructure assets means they serve multiple generations, forming the backbone of societal operations and development (Barnes & Lord, 2017). The social impact of infrastructure projects in New Zealand is intertwined with principles of sustainability, reflecting a commitment to ensuring that these developments meet the needs of the present without compromising the ability of future generations to meet their own needs (Blom, 2014).
- d.9 Public infrastructure works in New Zealand are essential for providing services, driving economic progress, and improving the overall well-being of society (Carrión-Barco, 2024). These projects not only contribute to the physical landscape but also play a crucial role in shaping social dynamics and equity within communities. For example, the provision of infrastructure, such as cycling facilities, influences individual perceptions and behaviours, particularly concerning sociodemographic characteristics, affecting cycling equity in places like Auckland, New Zealand (Jahanshahi et al., 2022). Infrastructure projects like Future Streets aim to address community needs and perceptions, especially in low-income areas, highlighting the importance of considering social aspects in infrastructure development (Thorne et al., 2020).
- d.10 Leadership styles in infrastructure projects also play a significant role in shaping social outcomes. Studies comparing leadership styles in post-disaster recovery projects with normal infrastructure projects in New Zealand have shown variations that can affect project success and social implications (Witton et al., 2019). Effective leadership is crucial for ensuring that infrastructure projects not only meet technical requirements but also address social needs and concerns within communities. Understanding public perceptions and engagement with infrastructure projects is vital for their success and acceptance,

emphasising the need for inclusive decision-making processes that consider the diverse perspectives of stakeholders (Susanto, 2019).

- d.11 In New Zealand, infrastructure reporting by local authorities is influenced by various contextual factors that can affect how the social aspects of projects are communicated and understood (Chatterjee et al., 2017). How infrastructure projects are managed and reported can shape public perceptions and expectations, highlighting the importance of transparent and informative communication to foster trust and engagement within communities. The design and management of infrastructure projects in New Zealand have the potential to transform society and people's daily lives, underscoring the need for careful planning and consideration of social affects throughout the project lifecycle (Wang et al., 2022).

Case study E – Poland

- e.1 Infrastructure projects in Poland have had significant socio-economic impacts over the years. The improvement in road infrastructure, as evidenced by the development of sustainable transport and road networks (Godzisz et al., 2021), has played a crucial role in the country's economic growth. The level of transport infrastructure development has been directly linked to increased foreign inbound tourism, showcasing the importance of infrastructure in supporting industries like tourism (Gołembski & Majewska, 2018). Moreover, the diversity in regional development of road transport infrastructure has been highlighted as a key factor in determining the socio-economic development of different regions in Poland (Bekisz & Kruszyński, 2021).
- e.2 Poland's experience in infrastructure development, compared to other EU countries like Germany and Spain, has shown common strengths such as fair public procurement practices and financial stability, which have contributed to overall infrastructure development (Slatvinska et al., 2021). The impact of infrastructure expenditures on local budgets and the resistance faced by communes in urban sprawl underscores the intricate economic and political dynamics involved in infrastructure investments (Lityński, 2017). Poland's fiscal policy has been strategically focused on developing economic infrastructure to enhance the country's economic model and value-added production (Sliusarchuk et al., 2021).
- e.3 The influence of transport infrastructure development on the accessibility of rural areas in Poland has been a subject of study, revealing that infrastructure length positively affects spatial and demographic density indices in rural regions (Kwarciński, 2021). Infrastructure development, as a major contributor to economic growth, has been recognised not only in Poland but also in South Asia, where investments in infrastructure have led to the creation of production facilities, reduced trade costs, and provided employment opportunities (Sahoo & Dash, 2012). The socio-economic effects of large-scale infrastructure projects, such as geothermal energy projects in Kenya, emphasise the importance of meeting socio-economic needs while considering environmental conservation (Nweke-Eze, 2024).
- e.4 In the context of Poland's economic transition, changes to road transport have been pivotal in supporting rapid economic development, although challenges arose due to increased trade demands on an outdated transport system (Waters, 1999). The role of private sector and non-governmental organisations in ensuring access to educational infrastructure in rural areas highlights the collaborative efforts needed to address infrastructure gaps (Wojewódzka-Wiewiórska & Stawicki, 2022). Municipal waste-to-energy projects in Poland have not only influenced waste management but also impacted the country's energy security (Cyranka et al., 2016).
- e.5 The disparities in regional development within Poland, as evidenced by taxonomic research,

showcase the varying strengths of different provinces in demographic potential, economic development, social development, and technical infrastructure (Pawlas, 2021). The SWOT analysis of the renewable energy sector in Mazowieckie Voivodeship reflects the progress and prospects in the region, indicating a growing trend towards renewable energy sources (Igliński et al., 2021). The utilization of EU funding for cultural projects in rural areas of Poland has contributed to the reconstruction and management of cultural assets, aligning with social and economic objectives (Powęska, 2018).

- e.6 The development of technical infrastructure as a component of sustainable development in rural regions emphasises the need for reliable and functional infrastructure to support overall sustainability goals (Surówka et al., 2021). Effective infrastructure development has been highlighted as essential for improving social and economic parameters, as seen in the case study of Himachal Pradesh, India (Tripathi et al., 2019). The promotion of electro-mobility in Poland underscores the importance of aligning infrastructure development with the country's economic system and social needs (Łuszczuk et al., 2021). The relationship between transport infrastructure and regional economic growth has been studied extensively, with findings suggesting that infrastructure construction in underdeveloped areas can significantly contribute to economic development and reduce regional disparities (Jiang et al., 2011).
- e.7 Infrastructure projects in Poland have significant social impacts that extend beyond just physical development. These projects play a crucial role in providing essential services, boosting economic growth, creating employment opportunities, and improving the overall quality of life by enhancing access to basic amenities and reducing travel times (Carrión-Barco, 2024). The modernisation of infrastructure in Poland, supported by various EU-funded initiatives, has helped to advance intermodal freight transport within the country, leading to improved connectivity and efficiency in the transportation sector (Mońka et al., 2021). The involvement of the private sector and non-governmental organisations has become increasingly vital in ensuring access to educational infrastructure in rural areas, highlighting a collaborative approach to addressing social needs (Wojewódzka-Wiewiórska & Stawicki, 2022).
- e.8 Public infrastructure projects, particularly those implemented through public-private partnerships (PPPs), represent substantial investments with strategic importance for the nation and society as a whole (Gupta & Verma, 2020). These projects not only contribute to economic development but also have far-reaching implications for social well-being. For instance, municipal waste-to-energy plants in Poland will revolutionise waste management practices and enhance the country's energy security, showcasing how infrastructure projects can have a direct impact on environmental sustainability and public health (Cyranka et al., 2016). The close interconnection between infrastructure development and social and environmental well-being underscores the importance of understanding public perceptions of such projects to make informed decisions that align with societal needs and values (Roelich

& Litman-Rovent, 2020).

- e.9 In the context of Poland, the success of infrastructure projects, especially those involving toll roads, hinges on their ability to deliver long-term community benefits throughout their lifecycle (Rohman et al., 2017). This underscores the importance of ensuring that these projects not only meet immediate needs but also contribute to sustainable development and societal well-being over time. The implementation of renewable energy projects, such as those focusing on expanding the share of renewable energy sources in Poland's energy mix, reflects a growing awareness of the social and environmental benefits associated with transitioning towards cleaner and more sustainable energy systems (Marks-Bielska et al., 2020).
- e.10 Infrastructure projects in Poland are not without challenges, particularly concerning financing and stakeholder engagement. The viability of PPP infrastructure projects can be hindered by factors such as project bankability, inconsistent government policies, and inefficiencies in the judicial system, highlighting the need for robust financial mechanisms and regulatory frameworks to support project delivery (Bolomope et al., 2020). Engaging local communities and stakeholders in the planning and implementation of infrastructure projects, such as hydropower developments, is essential for ensuring project acceptability, effectiveness, and social impact (Junker-Köhler & Sundt, 2021).
- e.11 The social sustainability of infrastructure projects in Poland is a critical aspect that requires careful assessment and consideration. Stakeholder influence plays a significant role in shaping the social performance of these projects, emphasizing the need for frameworks that accurately evaluate the value created for society (Doloi, 2012). Furthermore, the utilisation of EU funding for cultural assets in Poland's northern regions not only fosters the preservation and management of cultural heritage but also contributes to social and economic development, highlighting the multifaceted impact of infrastructure investments on local communities (Powęska, 2018).

Case study F – Portugal

- f.1 Infrastructure projects not only boost economic growth but also have far-reaching effects on society. They create employment opportunities, stimulate local businesses, and enhance the overall quality of life for residents. For example, broadband infrastructure, considered a General Purpose Technology (GPT), has a profound impact on economic growth, surpassing the effects of other similar technologies (Czernich et al., 2011). Additionally, infrastructure investments can expedite the provision of essential services, improve health and safety standards, and create economic opportunities, ultimately enhancing the quality of life for individuals and communities (Hussain et al., 2017).
- f.2 In the context of Portugal, the socio-economic effects of infrastructure projects are crucial for sustainable development and regional prosperity, and public policies, such as the Portuguese Operational Programme for Sustainability and Efficient Use of Resources (PO SEUR 2014–20) have focused on environmental sustainability and overall development (Medeiros et al., 2022). Furthermore, research has highlighted the territorial impacts of EU Cohesion Policy projects in Algarve, underscoring how these initiatives have influenced regional development over the years (Medeiros et al., 2022). These projects not only contribute to economic growth but also play a significant role in shaping the social and environmental landscape of the regions they serve.
- f.3 Moreover, the success factors in mega infrastructure projects (MIPs) are essential for understanding the lasting effects of such initiatives on the economy, climate, and society. emphasise the high-risk exposure and complexity associated with MIPs, highlighting their critical role in driving economic and social transformations (Seidu et al., 2022). The importance of sustainability in infrastructure projects cannot be overstated. Sierra et al. (2017) discuss the significance of social sustainability in infrastructure development, emphasising how these projects promote economic well-being and social interventions, fostering participation in sociopolitical processes.
- f.4 In assessing the socio-economic affects of infrastructure projects, it is essential to consider factors such as community engagement, environmental conservation, and long-term sustainability. The importance of meeting socio-economic requirements while conserving the environment during the construction of infrastructure projects, highlighting the need for a balanced approach that benefits both society and nature (Nweke-Eze, 2024). For example, the evaluation of road infrastructure projects underscores the interconnectedness of economic growth, social well-being, and infrastructure development, emphasising the holistic approach needed for decision-making in infrastructure investments (Arshad et al., 2021).
- f.5 Overall, infrastructure projects in Portugal have profound socio-economic implications that extend beyond mere physical development. These projects are catalysts for economic

growth, social progress, and environmental sustainability, shaping the future trajectory of the country and its regions. By considering the diverse impacts of infrastructure investments, from job creation to community development and environmental conservation, Portugal can harness the full potential of these projects to drive inclusive growth and prosperity for its citizens.

- f.6 Infrastructure projects in Portugal play a significant role in society, impacting various aspects of life. These projects are essential for providing crucial services, driving economic development, creating job opportunities, and enhancing the overall quality of life by improving access to basic amenities and reducing travel times (Carrión-Barco, 2024). Studies have shown that infrastructure investments are vital for economic growth and development in Portugal (Pereira & Pereira, 2018). Research has emphasised the importance of considering the environmental consequences of infrastructure investments, particularly in relation to industrial CO2 emissions (Pereira & Pereira, 2019).
- f.7 Ensuring the success of infrastructure projects from a societal perspective is crucial, as these projects have both short-term and long-term effects on communities. It is imperative for infrastructure projects to continuously benefit the community throughout their lifecycle to achieve overall success and positive social outcomes (Rohman et al., 2017). Community engagement and support are essential for sustainable infrastructure projects, underscoring the significance of involving the community early in the project development process to evaluate and address potential social impacts (Hasan & Ghosh, 2020).
- f.8 Mega infrastructure projects are crucial for sustainable development, but neglecting the social dimension during their planning and implementation phases can be detrimental to both the project and society. Therefore, it is essential to consider the social aspects of infrastructure projects to achieve sustainable outcomes (Mitoula & Papavasileiou, 2023). Access to comprehensive and high-quality data on infrastructure projects is vital for studying and mitigating their social-ecological impacts, highlighting the importance of open data standards in research and decision-making processes (Hyde, 2024).
- f.9 Efficiency and determinants analysis of infrastructure projects, especially in the context of public-private partnerships, can help prevent inefficiencies and ensure the stability of infrastructure services, ultimately benefiting society (Xu et al., 2019). Owner capabilities in social infrastructure projects are critical for their success, emphasising the importance of engaging with end-users and stakeholders throughout the project lifecycle (Gulino et al., 2020). Public engagement in infrastructure projects is essential for enhancing project acceptability, effectiveness, and social impact, highlighting the significance of participatory approaches in infrastructure development (Susanto, 2019).
- f.10 Estimating the social sustainability of infrastructure projects is essential for evaluating their

overall societal contribution and ensuring their long-term success (Sierra et al., 2017). Follow-up and social impact assessments in urban transport-infrastructure projects are crucial for determining the equitable distribution of project benefits and costs, emphasising the need for inclusive planning and decision-making processes (Mottee & Howitt, 2018). Understanding the social value of infrastructure projects is key to delivering projects that are not only technically successful but also socially beneficial (Fitton & Moncaster, 2022).

- f.11 Life cycle assessment and cost analysis in infrastructure projects are crucial for considering their economic, environmental, and social impacts from the planning stage onwards, highlighting the importance of a holistic approach to infrastructure development (Alaloul et al., 2021). Sustainability reporting tools for buildings and infrastructure aim to integrate environmental and social considerations alongside traditional project metrics, reflecting the industry's increasing focus on sustainability (Siew et al., 2013). Managing the design decision-making processes in urban infrastructure projects is challenging because of their complexity and high social impact, emphasising the need for effective resource allocation and problem-solving strategies (Žerjav, 2015).
- f.12 Assessing the impact of community and social projects on social infrastructural development is essential for understanding the role of grassroots initiatives in driving local development and improving community well-being (Kwaghza, 2023). Framing social sustainability in infrastructure projects is crucial for addressing the affects on neighbouring communities and end-users, emphasising the need for a comprehensive approach to project planning and implementation (Treviño-Lozano, 2022). Evaluating the operation and maintenance management of mega infrastructure projects is essential for ensuring their long-term success and their positive impact on social development and livelihoods (Chen et al., 2020).

Case study G – Quebec

- g.1 Infrastructure projects in Quebec, Canada, particularly the implementation of integrated project delivery (IPD) in public procurement processes, have significant socio-economic implications. These projects aim to enhance functional, environmental, and economic objectives (Jobidon et al., 2018). Large-scale infrastructure projects, such as geothermal energy projects in Kenya, have been shown to have extensive socio-economic affects that extend beyond the immediate project site, affecting nearby and distant areas with short, medium, and long-term effects (Nweke-Eze, 2024). Public construction infrastructure projects are crucial tools for improving community socio-economic conditions and fostering community development (Hussain et al., 2022b).
- g.2 In Quebec, the Société québécoise des infrastructures (SQI) plays a key role in advising the government on public infrastructure projects and aims to implement IPD and building information modelling (BIM) processes in major projects, emphasising the importance of contractual approaches in these endeavours (Jobidon et al., 2019). Infrastructure projects not only contribute to economic growth but also enhance business and investment opportunities, making the national economy and its regions more socially attractive (Yurieva et al., 2021). These projects are expected to generate broader social value beyond the primary advantages derived from asset construction, emphasising their role in creating sustainable economic growth and social attractiveness (Wang, 2023).
- g.3 Moreover, the governance of major public infrastructure projects in Quebec, as evidenced by a case study in the health sector, highlights the importance of qualitative research in understanding the socio-economic effects of such endeavours (Brunet & Aubry, 2018). The successful creation of social value in infrastructure delivery is crucial, and lessons learned from various projects can guide future initiatives to ensure desired social outcomes are achieved (Watts et al., 2022).
- g.4 Social infrastructure, which includes projects aimed at enhancing the quality of life and well-being of communities, plays a vital role in socio-economic development (Kwaghza, 2023). The evaluation of sustainable infrastructure rating systems in developing countries underscores the importance of infrastructure investment in stimulating economic activities, employment generation, and supporting socio-economic policies (Diaz-Sarachaga et al., 2016). Public-private partnerships (PPPs) in infrastructure development have been instrumental in addressing social issues and delivering projects like housing, healthcare facilities, and courthouses (Khallaf et al., 2022). Stakeholders' influence on the social performance of infrastructure projects is critical in ensuring the effective creation of social value and fostering sustainable development (Doloi, 2012).
- g.5 Infrastructure projects in Quebec have significant social affects that reverberate throughout

the province. Implementing integrated project delivery (IPD) in Quebec's procurement process for public infrastructure aims to enhance functional, environmental, and economic objectives (Jobidon et al., 2018). This shift in procurement methods can lead to improved project outcomes and potentially foster better community engagement and satisfaction. The adoption of building information modelling (BIM) processes in major projects can streamline construction processes and improve overall project efficiency (Jobidon et al., 2019). By incorporating these advanced methodologies, infrastructure projects in Quebec may become more sustainable and responsive to the needs of the local population.

- g.6 Moreover, the social impact of infrastructure projects extends beyond the construction phase. For instance, the development of new motorways can have varying effects on regional growth depending on the nature of the connection established and the underlying conditions of the territories involved (Crescenzi & Rodríguez-Pose, 2012). In Quebec, the introduction of public-private partnerships (PPPs) has raised concerns about democratic governance and political control over infrastructure projects (Hudon, 2011). This shift in project financing and management can influence how communities perceive and benefit from infrastructure developments.
- g.7 The socioeconomic implications of infrastructure projects are crucial for understanding their broader effects on society. Investments in transport infrastructure projects are recognised by governments as essential for achieving socioeconomic goals (Dimitriou & Sartzetaki, 2022). With the China-Pakistan Economic Corridor, the project is expected to enhance the socioeconomic indicators of underdeveloped regions, showcasing the potential for infrastructure initiatives to drive positive change (Khan & Liu, 2019). However, it is essential to consider the diverse effects of such projects, as seen with the Merowe Dam in Sudan, where local communities experienced both positive and adverse effects on their livelihoods and income (Abdullah et al., 2020).
- g.8 Additionally, the environmental aspects of infrastructure projects play a significant role in shaping their social impact. Sustainable development concepts can influence decision-making processes and mitigate the environmental consequences of infrastructure development (Thouez et al., 2007). Climate change poses a significant challenge to infrastructure projects, with permafrost degradation threatening the integrity of constructions in Arctic and high-altitude regions (Hjort et al., 2022). Addressing these environmental concerns is crucial for ensuring the long-term sustainability of infrastructure projects and minimising their negative social repercussions.
- g.9 Furthermore, the displacement of communities because of infrastructure projects can have profound social implications. Development-induced displacement, as observed in projects like dams and mines, often leads to a decline in livelihoods among affected communities (Randell, 2016). Understanding and addressing the social consequences of displacement is

essential for promoting fair development and safeguarding the well-being of vulnerable populations. Road infrastructure projects in urban areas can lead to gentrification and the displacement of poor residents, altering social dynamics and community integration (Khanani et al., 2020b). These social disruptions highlight the need for inclusive planning processes that prioritise the well-being of all community members.

Case study H – Republic of Ireland

- h.1 Infrastructure development directly affects economic growth, social development, and the quality of life in regions, showcasing the interconnectedness between infrastructure and socio-economic progress (Ignatieva et al., 2020). In the Republic of Ireland, the utilisation of public-private partnerships (PPPs) for social infrastructure procurement, such as schools and health facilities, has been a prevalent practice for almost two decades (O’Shea et al., 2020). The adoption of the PPP model has allowed the Irish government to address critical infrastructure deficits without overburdening the national exchequer (Hurst & Reeves, 2004). This approach aligns with global trends and emphasises the importance of innovative financing mechanisms for infrastructure projects to drive socio-economic development (Busari & Ndlovu, 2012).
- h.2 The uneven distribution of infrastructural provision across Ireland not only reflects issues of exclusion but also creates opportunities for different infrastructural projects to unfold, shaping the socio-economic landscape of the country (Bresnihan & Hesse, 2020). The socio-economic impact of infrastructure projects is not limited to technical aspects but also encompasses social, political, and economic dimensions, highlighting the multifaceted nature of infrastructure systems (McArthur, 2018). Infrastructure projects in the Republic of Ireland have the potential to transform communities through which they pass, influencing local economies, social dynamics, and overall development (Kumar, 2024).
- h.3 However, challenges such as project delays can have detrimental effects on both the economic and social aspects of infrastructure initiatives, impacting workforce skills, poverty alleviation efforts, education services, agricultural growth, and sustainable community development (Hussain et al., 2017). Meaningful engagement with local stakeholders is crucial in the planning and development process of infrastructure projects, especially in the face of opposition and concerns from communities (Walsh, 2016). Effective engagement strategies can help address resistance and ensure that infrastructure projects align with the socio-economic needs and aspirations of the local population.
- h.4 The introduction of tools like PPPs in infrastructure financing is relevant in the current socio-economic landscape, offering avenues for funding large-scale projects and driving economic growth. Infrastructure spending is viewed as a means to stimulate economic activity and support countries in overcoming crises, emphasising the role of infrastructure in fostering socio-economic development (Abidin, 2010). The pressure on industry practitioners to incorporate environmental and social considerations in infrastructure projects underscores the growing importance of sustainability in infrastructure development (Siew et al., 2013).
- h.5 Major factors influencing the social implications of infrastructure projects include settlement patterns, livelihood impacts, public infrastructure development, and health and safety

considerations, highlighting the diverse socio-economic aspects that infrastructure initiatives can influence (Devapriya & Shanika, 2021). Infrastructure projects not only contribute to national development but also serve as platforms to showcase a country's culture, heritage, and people, emphasising the broader socio-economic significance of such endeavours (Maguire, 2019). Viewing regional infrastructure as a system essential for the functioning and development of the economy underscores the critical role of engineering and technical infrastructure in supporting socio-economic systems (Fedulova et al., 2020).

- h.6 Assessing the resilience and sustainability of critical infrastructures is becoming increasingly important, especially in the face of natural hazards that can significantly affect socio-economic welfare (Urbina & Oscar, 2023). Water environment treatment PPP projects are noted to have substantial social and economic affects compared to other infrastructure projects, underlining the significance of different infrastructure initiatives in driving socio-economic progress (Zhang et al., 2021). The socio-economic, ecological, cultural, and safety affects of infrastructure projects are critical considerations in project planning and implementation, emphasising the need for comprehensive assessments to address potential challenges and maximise benefits (Slevin, 2019).
- h.7 Infrastructure projects in the Republic of Ireland have a significant social impact, influencing various aspects of society. Public infrastructure projects play a crucial role in providing essential services, fostering economic development, generating employment opportunities, and improving the overall quality of life by ensuring access to basic amenities and reducing travel times (Carrión-Barco, 2024). These projects are not just about physical structures but are integral to societal well-being and progress. Using public-private partnerships (PPPs) in the Republic of Ireland for procuring social infrastructure like schools, courthouses, and health facilities, showcasing how these collaborations have helped to advance social services and amenities across the country (O'Shea et al., 2020).
- h.8 The social implications of PPP infrastructure projects are significant, given their substantial investments and strategic importance to the nation and its citizens. As highlighted by various researchers, including Chan et al. (2011) and Hurst & Reeves (2004), PPPs have helped to address wider public policy objectives such as combating social exclusion and enhancing public services. These projects involve diverse stakeholders with varying interests and expectations, as noted by Rohman et al. (2017), underscoring the complexity of managing infrastructure developments that cater to societal needs while aligning with economic objectives.
- h.9 The complexity of urban infrastructure projects often presents challenges in decision-making processes because of the diverse knowledge domains involved (Žerjav, 2015). Moreover, the relationship between costs and public perceptions of infrastructure projects highlights how these projects not only drive economic trends and societal change but also face

criticism and negative perceptions. This underscores the importance of effective communication and transparency in infrastructure development to garner public support and ensure project success.

- h.10 Community engagement is crucial in infrastructure projects and involving communities in the planning and development processes to ensure projects meet their expectations (Walsh, 2016). Community projects, when nurtured effectively, can contribute to sustainable development and address local needs. Additionally, assessing the social performance of infrastructure projects is essential for understanding the value created and the impact on society, emphasising the need for frameworks that accurately evaluate social outcomes.
- h.11 In the context of the Republic of Ireland, where infrastructure provision varies across regions, it is essential to address disparities to prevent exclusion and ensure fair development (Bresnihan & Hesse, 2020). The uneven distribution of infrastructure can perpetuate social inequalities, emphasising the need for inclusive and sustainable infrastructure planning and implementation. Furthermore, the success of infrastructure projects, particularly in PPPs, relies on factors such as risk assessment, stakeholder engagement, and compliance with international standards (Ogwang & Vanclay, 2021).
- h.12 Public acceptance and perceptions of infrastructure projects play a crucial role in decision-making and risk communication, underscoring the importance of understanding social-psychological factors that influence public attitudes (Ge et al., 2020). Engaging the public in the planning and implementation of infrastructure projects is vital for ensuring that projects align with community preferences and environmental considerations (Junker-Köhler & Sundt, 2021). This participatory approach not only enhances project acceptability but also contributes to sustainable infrastructure development.

Case study I – Scotland

- i.1 Infrastructure projects in Scotland have a significant socio-economic impact, influencing various aspects of society and the economy. These projects play a crucial role in driving economic growth, enhancing the quality of life, creating job opportunities, and improving access to essential services. The development of infrastructure, such as road networks, airports, and power generation projects, directly contributes to socio-economic development by supporting economic activities and improving connectivity. Infrastructure investments have been recognised as fundamental tools for enhancing community socio-economic conditions and promoting community development (Hussain et al., 2022b).
- i.2 Infrastructure projects not only stimulate economic growth but also have far-reaching effects on social well-being and quality of life. They enable the provision of basic amenities, reduce commute times, and enhance access to services, thereby positively impacting the overall welfare of the population (Hussain et al., 2017). Moreover, the implementation of infrastructure projects creates prerequisites for sustainable economic growth, improves business and investment environments, and enhances the social attractiveness of the national economy and its regions (Yurieva et al., 2021). These projects are essential for raising the quality of life, supporting better health, ensuring safety, and providing economic opportunities and leisure activities.
- i.3 The socio-economic impact of infrastructure projects extends beyond immediate economic benefits. They have the potential to transform communities by improving living standards, alleviating poverty, and fostering sustainable development (Menhas et al., 2019). By investing in infrastructure, countries like Scotland can enhance their economic competitiveness, attract investments, and create a conducive environment for businesses to thrive (Yurieva et al., 2021). Furthermore, infrastructure development directly influences social development, economic growth, and the overall quality of life in regions (Ignatieva et al., 2020).
- i.4 In Scotland, as in many other regions, infrastructure projects are crucial for shaping socio-spatial relations, establishing social norms, and influencing power dynamics within society (McArthur, 2018). The provision of high-quality infrastructure can attract sophisticated economic activities and contribute to the overall economic development of the region (Filion & Keil, 2016). Conversely, inadequate or depleted infrastructure can hinder economic progress and limit the potential for growth and development. Therefore, investing in infrastructure is not just about physical development but also about fostering social progress and economic prosperity.
- i.5 The socio-economic impact of infrastructure projects in Scotland can be further understood by examining the specific benefits they bring to different interest groups at national and local

community levels (Nweke-Eze, 2024). These projects generate various infrastructures that cater to different socio-economic development needs, thereby creating opportunities for diverse groups within society. By addressing the infrastructure requirements of different sectors, such as energy, transportation, and social services, these projects contribute to the overall well-being and development of the population.

- i.6 Infrastructure projects in Scotland have a significant impact on society, influencing various aspects of daily life and community well-being. These projects play a crucial role in providing essential services, boosting economic development, creating employment opportunities, and improving the overall quality of life by enhancing access to basic amenities and reducing travel times. The Community Empowerment (Scotland) Act has been a significant step towards promoting localism in the design and delivery of public services in Scotland, empowering communities and fostering greater engagement in decision-making processes (Elliott et al., 2019). Moreover, the Scottish Government has been at the forefront of encouraging community involvement in renewable energy projects, aiming to enhance local engagement in planning processes and ensure that communities benefit from such developments (Macdonald et al., 2017).
- i.7 Large infrastructure projects not only shape economic trends but also influence societal structures, affecting economic growth while also facing criticism and negative perceptions. Stakeholder engagement is crucial in infrastructure projects, as it allows for the alignment of project objectives with the interests of local communities, promoting transparency and accountability in decision-making processes (Baharuddin et al., 2022). Public-Private Partnership (PPP) projects in infrastructure carry significant investments and strategic importance, causing the alignment of project sponsors to manage various funding and non-funding risks effectively (Gupta & Verma, 2020). The success of infrastructure projects is closely tied to stakeholder participation and effective engagement, which can be complex and contentious but is essential for sustainable development (Deverka et al., 2012).
- i.8 In Scotland, public perceptions of infrastructure projects, such as highways and toll roads, play a vital role in determining their acceptance and success. Factors such as benefit perception, trust perception, and risk perception significantly influence public acceptance of these projects, highlighting the importance of addressing community concerns and ensuring transparency in project implementation (Ge et al., 2020). Moreover, the social impact of infrastructure projects extends to habitat restoration measures, which can garner public support, streamline regulatory processes, reduce costs, and foster innovation, emphasising the importance of considering environmental aspects in project planning (Jensen, 2017).
- i.9 Deer management in Scotland serves as a case study illustrating how infrastructure projects can have environmental and socio-economic implications that resonate with the public. Large deer populations in Scotland have been associated with negative impacts on

ecosystems, agriculture, forestry, public health, and road safety, underscoring the need for effective management strategies that consider public perceptions and local knowledge (Hare et al., 2021). Understanding public perceptions of infrastructure projects, such as deer management and renewable energy initiatives, is essential for ensuring successful project outcomes and fostering community engagement (Whitefield et al., 2021).

4. LESSONS LEARNED FROM THE CASE STUDIES

- 4.01 Infrastructure projects should not solely prioritise economic gains but also prioritise social considerations and community well-being. Engaging stakeholders, particularly local communities, ensuring equitable benefit-sharing, and promoting transparency are crucial for maximising the positive impacts of infrastructure development while mitigating potential negative consequences.
- 4.02 While infrastructure projects can bring positive outcomes at a regional level, such as improved transportation or energy access, they may also create adverse social impacts at the local level. For instance, road developments can enhance regional connectivity but may lead to displacement or disruption of local communities.
- 4.03 Integrating social sustainability considerations from the project's inception is paramount. This involves conducting thorough social impact assessments throughout the project lifecycle to anticipate, address, and minimise potential negative consequences for communities.
- 4.04 Actively involving stakeholders, particularly community members, in the decision-making process is essential for ensuring that infrastructure projects align with local needs, expectations, and values, ultimately fostering more socially sustainable outcomes.
- 4.05 Infrastructure projects, particularly those in the renewable energy sector, should strive to distribute economic benefits fairly among communities. This can involve mechanisms like Community Benefit Funds (CBFs), which provide financial contributions to host communities, ensuring they directly benefit from the projects.
- 4.06 Promoting local and community ownership of infrastructure projects, especially in the realm of renewable energy, empowers communities with greater control over resources and can lead to more sustainable, long-term economic benefits.
- 4.07 Establishing mechanisms like community benefits registers can enhance transparency by tracking and publicly disclosing CBF contributions, ensuring accountability in the use of funds meant to benefit communities.
- 4.08 Advocating for policy changes that mandate CBFs for infrastructure projects and provide increased support for community-led initiatives can promote more equitable outcomes and a just transition, particularly in sectors like renewable energy.
- 4.09 Infrastructure projects should be designed and implemented with a focus on social sustainability from the outset. This requires conducting thorough social impact assessments before and throughout the project lifecycle to identify and mitigate potential negative impacts on communities.

- 4.10 Actively involving stakeholders, especially the public, in the decision-making process is essential for ensuring that infrastructure projects align with community needs and expectations. This engagement can lead to more socially sustainable outcomes.
- 4.11 Infrastructure projects can have positive effects at a regional level while simultaneously having adverse effects at the local level. It is crucial to carefully consider and address these potential disparities. For example, a new highway might reduce travel time regionally but displace residents locally.
- 4.12 Employing Social cost-benefit analysis (SCBA) is vital for evaluating the social costs and benefits of infrastructure projects. This ensures that decisions are made with a comprehensive understanding of their impact on society, going beyond just economic considerations.
- 4.13 In the context of renewable energy infrastructure projects, it is vital to ensure an equitable energy transition that directly benefits communities. This means ensuring that the economic benefits of renewable energy projects are shared fairly with host communities.
- 4.14 Promoting local and community ownership of renewable energy projects can ensure greater control over resources and long-term economic benefits for communities.
- 4.15 Ensuring that the wealth generated by infrastructure projects, particularly in the renewable energy sector, is redistributed effectively within communities is crucial. This helps ensure that no one is left behind during the transition to net zero and can foster support for renewable infrastructure by reducing local opposition.

5. ENSURING JUST AND FAIR ENERGY PRODUCTION IN WALES

- 5.01 Engaging with communities to discover their needs is a critical aspect of infrastructure development that ensures projects are relevant, sustainable, and beneficial to the populations they serve. Infrastructure developers can adopt various strategies to foster meaningful engagement with communities, which can lead to more effective planning and implementation processes.
- 5.02 The importance of community participation in infrastructure planning cannot be overstated. Research indicates that involving local communities in the planning process enhances project outcomes by aligning them with the actual needs and preferences of the residents. For instance, Cotton emphasises that the devolution of power and citizen involvement in decision-making were integral to the UK planning system, particularly under the Labour Government in 1997, which aimed to empower communities in public service delivery (Cotton, 2014). This historical context illustrates that community engagement is not merely a contemporary trend but a foundational principle of effective governance.
- 5.03 Moreover, the conceptual framework for social infrastructure developed by Davern et al. underscores the necessity of addressing the diverse service needs of all age groups within communities, including health, education, and recreational services (Davern et al., 2017). By understanding these needs, developers can tailor infrastructure projects to support the well-being of the entire community, thereby fostering a sense of ownership and responsibility among residents. This participatory approach is echoed in the findings of Hidayat, who notes that community involvement is essential for the successful management and maintenance of environmental infrastructure (Hidayat, 2023). Without active participation, projects may fail to meet the long-term needs of the community, leading to underutilisation or neglect.
- 5.04 In addition to understanding needs, effective communication strategies are paramount in engaging communities. Goodspeed and Hackel highlight the importance of developing planning support systems that facilitate social interaction and community debate (Goodspeed & Hackel, 2017). This can be achieved through workshops, public forums, and digital platforms that allow for real-time feedback and discussion. Such platforms not only inform residents about upcoming projects but also invite their input, ensuring that diverse perspectives are considered in the planning process. Similarly, the work of Ng et al. emphasises that public engagement is crucial for identifying community interests and concerns prior to finalising infrastructure designs (Ng et al., 2014). This proactive approach helps mitigate potential conflicts and fosters a collaborative atmosphere.
- 5.05 Furthermore, the role of education and training in enhancing community engagement cannot be overlooked. Sun et al. demonstrate that participatory planning workshops can significantly

improve participants' understanding of eco-community planning concepts, thereby empowering them to contribute meaningfully to discussions about local infrastructure (Sun et al., 2019). By equipping community members with knowledge and skills, developers can create a more informed citizenry that is better prepared to engage in the planning process.

- 5.06 Another critical aspect of community engagement is the recognition of local knowledge and expertise. Shrestha's mixed-methods approach reveals that local communities possess valuable insights into the socio-economic impacts of infrastructure development, which can inform more equitable and effective planning (Shrestha, 2022). By actively involving community members in the assessment and decision-making processes, developers can leverage this local knowledge to create solutions that are culturally and contextually appropriate.
- 5.07 Moreover, the integration of technology in community engagement strategies can enhance participation. For instance, the use of Geographic Information Systems (GIS) in participatory planning allows communities to visualise proposed infrastructure projects and their potential impacts. This technology not only aids in communication but also empowers residents to express their preferences and concerns in a more tangible manner. Additionally, the incorporation of digital tools can facilitate broader outreach, ensuring that marginalised voices are also heard in the planning process.
- 5.08 The significance of building trust between developers and communities is another crucial element of successful engagement. As highlighted by Kamau et al., the involvement of Community Education Committees in school development projects in Somaliland led to improved access and quality of facilities, demonstrating that trust and collaboration can yield positive outcomes (Kamau et al., 2021). Establishing transparent communication channels and demonstrating a genuine commitment to addressing community needs can foster this trust, making residents more likely to engage actively in the planning process.
- 5.09 Furthermore, the concept of adaptive planning, as discussed by Veenma, emphasises the need for flexibility in infrastructure development to accommodate changing community needs and preferences (Veenma, 2023). This approach encourages ongoing dialogue and feedback, allowing projects to evolve in response to community input. By adopting adaptive planning practices, developers can ensure that infrastructure remains relevant and beneficial over time.

Engaging with communities

- 5.10 Engaging with communities to understand their needs is a multifaceted process that requires a comprehensive approach tailored to the specific context and characteristics of the community in question. Effective community engagement is not merely about gathering information; it involves building trust, fostering collaboration, and ensuring that community

members are active participants in the decision-making processes that affect their lives. There are various scholarly perspectives on community engagement strategies, emphasising the importance of understanding community dynamics, employing culturally sensitive methods, and utilising participatory approaches.

- 5.11 To begin with, it is essential to recognise that community engagement is fundamentally about establishing relationships. Brunton et al. highlight that understanding the definitions, needs, and motivations of communities provides a foundational framework for structuring community engagement efforts (Brunton et al., 2017). This understanding is crucial because it allows for the design of interventions that are not only relevant but also culturally appropriate. Similarly, Han et al. emphasise that successful healthcare interventions rely on community engagement at every stage, from assessing the acceptability of innovations to ensuring the sustainability of implemented strategies (Han et al., 2021). This underscores the necessity of involving community members from the outset to ensure that their voices are heard and their needs are prioritised.
- 5.12 Moreover, the importance of trust in community engagement cannot be overstated. Dietrich et al. discuss the role of Community Advisory Boards (CABs) in fostering trusted partnerships between researchers and community members (Dietrich et al., 2022). Trust is a critical component that facilitates open communication and collaboration, which are essential for understanding community needs. Klusaritz et al. further support this notion by asserting that community engagement enhances the relevance and cultural rigor of research, ultimately leading to more meaningful outcomes (Klusaritz et al., 2022). Therefore, building trust through consistent and respectful engagement is a vital strategy for understanding community needs.
- 5.13 In addition to trust, the context in which engagement occurs is paramount. This contextual understanding is crucial for developing effective engagement strategies that resonate with community members. For instance, McRae discusses how universities can play a unifying role in connecting with communities on local and global issues, but emphasises the need for effective conceptualisation and implementation of engagement strategies (McRae, 2012). This highlights the necessity of adapting engagement approaches to fit the unique characteristics of each community.
- 5.14 Furthermore, participatory approaches are essential for effective community engagement. Tindana et al. argue that community engagement should focus on issues directly experienced by the community, rather than imposing external agendas (Tindana et al., 2015). This participatory ethos is echoed by Kaehler et al., who found that genuine engagement with community members is crucial for addressing health challenges such as malaria (Kaehler et al., 2021). Engaging communities as partners rather than subjects of research fosters a sense of ownership and empowerment, which is vital for understanding

their needs and priorities.

- 5.15 Communication strategies also play a significant role in community engagement. Spears et al. highlight the efficacy of community engagement strategies that emphasise building trust and fostering open communication (Spears et al., 2014). Effective communication is not just about disseminating information; it involves actively listening to community members and incorporating their feedback into decision-making processes. This is supported by Broder et al., who emphasise the importance of establishing meaningful engagement strategies to build rapport and culturally appropriate education (Broder et al., 2020). Thus, communication should be a two-way street, allowing for dialogue and collaboration.
- 5.16 Moreover, the involvement of community leaders and organisations is crucial for successful engagement. Mirza et al. stress the importance of sharing experiences and challenges faced by researchers working with underserved communities, as this fosters a collaborative learning environment (Mirza et al., 2018). Engaging community leaders can help bridge gaps between researchers and community members, ensuring that engagement efforts are relevant and effective. Martínez et al. further emphasise that increased communication with stakeholders is vital for overcoming barriers to engagement (Martínez et al., 2018). This collaborative approach not only enhances understanding but also builds a network of support for community initiatives.
- 5.17 Additionally, the use of innovative engagement strategies can enhance participation. For instance, Lim et al. discuss the effectiveness of participatory visual methods in increasing engagement and communication among community members (Lim et al., 2018). Such methods allow participants to share their stories and experiences, fostering deeper connections between researchers and the community. Similarly, Mayo-Gamble et al. advocate for the use of community health ambassadors as a strategy to engage underserved communities in health-related research (Mayo-Gamble et al., 2020). These innovative approaches can help overcome barriers to engagement and ensure that community needs are adequately addressed.

Community benefit funds

- 5.18 Infrastructure developers create community benefit funds (CBFs) to address the socio-economic impacts of their projects, enhance community engagement, and ensure sustainable development. The establishment of these funds is increasingly recognised as a crucial mechanism for fostering positive relationships between developers and local communities, particularly in the context of large-scale infrastructure projects that may disrupt existing social and environmental balances.
- 5.19 One of the primary reasons for the creation of community benefit funds is to mitigate the socio-economic costs associated with infrastructure development. As highlighted by Culp in

his analysis of transportation infrastructure projects, the implementation of such projects often leads to significant social disruptions, including displacement and changes in local economic conditions (Culp, 2021). By establishing CBFs, developers can provide financial resources that support local initiatives, thereby helping to alleviate some of the adverse effects of their projects. This approach not only compensates affected communities but also fosters goodwill and enhances the overall acceptance of the project (Ge et al., 2020).

- 5.20 Moreover, community benefit funds serve as a means to enhance community liveability and sustainability. Research indicates that when communities are actively involved in the planning and implementation of infrastructure projects, they are more likely to perceive benefits from these developments (Scott-Buechler et al., 2023). CBFs can be used to finance local projects that align with community needs, such as educational programs, healthcare facilities, or environmental conservation efforts. This not only helps to improve the quality of life for residents but also ensures that the benefits of infrastructure development are distributed more equitably across the community (Shrestha, 2022).
- 5.21 In addition to addressing immediate socio-economic impacts, CBFs play a vital role in promoting long-term sustainability. The integration of sustainability principles into infrastructure projects is increasingly recognised as essential for achieving broader social, economic, and environmental goals (Reidy, 2019). By allocating funds to community-driven sustainability initiatives, developers can contribute to the achievement of the United Nations Sustainable Development Goals (SDGs), particularly those related to poverty alleviation, education, and environmental protection (Locatelli, 2023). This alignment with global sustainability objectives not only enhances the reputation of developers but also attracts potential investors who prioritise socially responsible investment (Hellström et al., 2021).
- 5.22 Furthermore, the establishment of community benefit funds can enhance the transparency and accountability of infrastructure projects. As noted by Adugbila et al., the involvement of local communities in the decision-making process regarding the allocation of funds fosters a sense of ownership and responsibility among residents (Adugbila et al., 2022). This participatory approach not only empowers communities but also ensures that funds are utilised effectively to address the most pressing local needs. By promoting transparency in fund management, developers can build trust with the community, which is crucial for the successful implementation of future projects (Mulligan et al., 2011).
- 5.23 The strategic use of community benefit funds can also serve as a tool for risk management. Infrastructure projects are often subject to public scrutiny and opposition, particularly when they are perceived to threaten local livelihoods or the environment. By proactively addressing community concerns through CBFs, developers can mitigate the risks associated with project delays or cancellations due to public dissent (BlomCarron & GuthriePeter, 2016). This proactive engagement can lead to smoother project execution and a more favourable

regulatory environment, ultimately benefiting both developers and communities (Salleh, 2023).

- 5.24 Community benefit funds in the United Kingdom represent a significant mechanism through which local communities can receive financial support for various initiatives aimed at enhancing social welfare, economic development, and environmental sustainability. These funds are often derived from specific projects, particularly in sectors such as renewable energy, where developers contribute a portion of their profits to local communities as a form of compensation for the impact of their projects. This practice has evolved over time, reflecting a growing recognition of the importance of community engagement and benefit-sharing in development projects.
- 5.25 The concept of community benefit funds is particularly prominent in the context of renewable energy projects, such as offshore wind farms. These projects often generate substantial revenues, and a portion of these revenues is allocated to community benefit funds, which are then used to support local initiatives. For instance, in the UK, community benefit funds from offshore wind farms have been utilised to finance local tourism and recreation facilities, demonstrating a tangible link between energy production and community development (Glasson, 2020). This model not only helps mitigate the impact of such projects on local communities but also fosters a sense of ownership and participation among residents, thereby enhancing social cohesion (Rudolph et al., 2017).
- 5.26 Moreover, the allocation of community benefit funds is typically guided by principles of transparency and community involvement. Local stakeholders are often engaged in the decision-making process regarding how these funds should be spent, ensuring that the initiatives funded align with the community's needs and priorities. This participatory approach is crucial for the success of community benefit funds, as it empowers residents and fosters a sense of agency in local development (Thomson, 2024). The effectiveness of such funds is further enhanced when they are integrated into broader community development strategies, which may include health promotion, environmental sustainability, and economic resilience (Strachan et al., 2015).
- 5.27 In addition to renewable energy projects, community benefit funds can also emerge from various other sources, including local government initiatives and charitable contributions. For example, the National Lottery in the UK has been instrumental in funding community projects through a hypothecated tax system, where revenues are specifically allocated for community development activities (Hayes & Dockerill, 2020). This funding model has enabled the establishment of numerous community-led initiatives, such as Healthy Living Centres, which aim to improve health outcomes in underserved areas (Poland et al., 2013). The flexibility of community benefit funds allows them to be directed towards a wide range of activities, from infrastructure development to social services, thereby addressing diverse community needs.

- 5.28 The impact of community benefit funds extends beyond immediate financial support; they also play a critical role in fostering long-term community resilience. By investing in local projects that enhance social capital, such as community gardens or educational programs, these funds contribute to the overall well-being of communities (Wardle, 2024). Furthermore, the establishment of community benefit funds can stimulate local economies by creating jobs and supporting local businesses, thereby contributing to economic sustainability (Dallison, 2023). This multifaceted approach to community development underscores the importance of integrating financial support with strategic planning and community engagement.
- 5.29 Despite the potential benefits, the implementation of community benefit funds is not without challenges. Issues such as funding sustainability, accountability, and equitable distribution of resources can hinder the effectiveness of these initiatives (Rudolph et al., 2017). For instance, in some cases, the funds may be insufficient to meet the community's needs, leading to frustration among residents (Strachan et al., 2015). Additionally, the reliance on voluntary contributions from developers can create uncertainty in funding availability, making it difficult for communities to plan long-term projects (Glasson, 2020). Addressing these challenges requires a concerted effort from all stakeholders, including government agencies, private sector partners, and community organisations, to ensure that community benefit funds are effectively managed and utilised.

Community benefit funds in Wales

- 5.30 Community Benefit Funds (CBFs) in Wales represent a significant mechanism for channelling financial resources into local communities, aimed at enhancing social, economic, and environmental well-being. These funds are typically established to ensure that communities benefit from local developments, particularly in sectors such as renewable energy, where projects may generate substantial profits. The funds are designed to support various community initiatives, including education, health, and infrastructure projects, thereby fostering community resilience and sustainability (Jones-Evans, 2015; Cook & Fallon, 2016).
- 5.31 The origins of community benefit funds in Wales can be traced back to the late 1990s when the need for public sector intervention to support local economies was recognised. This recognition led to the establishment of various funding mechanisms aimed at supporting small and medium-sized enterprises (SMEs) and community projects. The Welsh Government has played a pivotal role in facilitating access to these funds, which are often derived from profits generated by local developments, such as wind farms and other renewable energy projects (Jones-Evans, 2015). The funds are typically managed by local community groups or trusts, ensuring that the allocation of resources aligns with the specific needs and priorities of the community (Cook & Fallon, 2016).

- 5.32 Community Benefit Funds operate on the principle of localism, emphasising the importance of community engagement in decision-making processes. This approach ensures that the funds are utilised in ways that reflect the aspirations and needs of local residents. For instance, community members may be involved in identifying priority projects, thereby fostering a sense of ownership and accountability (Cook & Fallon, 2016). The participatory nature of these funds is crucial, as it not only enhances transparency but also builds trust between community members and fund managers, ultimately leading to more effective and impactful use of resources (Cook & Fallon, 2016).
- 5.33 In practice, Community Benefit Funds have been utilized for a wide range of initiatives across Wales. These include funding for local sports facilities, community centres, educational programs, and environmental projects aimed at enhancing biodiversity and sustainability (Cook & Fallon, 2016). The funds have also been instrumental in supporting vulnerable populations, including low-income families and individuals with disabilities, by providing resources for essential services and support networks (Cook & Fallon, 2016). This multifaceted approach to community investment underscores the versatility and adaptability of CBFs in addressing diverse community needs.
- 5.34 The impact of Community Benefit Funds extends beyond immediate financial support; they also contribute to long-term community development and empowerment. By investing in local projects, these funds help to stimulate economic activity, create jobs, and enhance the overall quality of life for residents (Jones-Evans, 2015; Cook & Fallon, 2016). Furthermore, the funds often leverage additional resources from other sources, such as government grants and private donations, thereby amplifying their impact (Cook & Fallon, 2016). This synergistic effect is particularly evident in rural areas, where access to funding can be more challenging, and CBFs play a critical role in bridging funding gaps (Cook & Fallon, 2016).
- 5.35 Despite their successes, Community Benefit Funds in Wales face several challenges. These include ensuring sustainable funding streams, navigating regulatory frameworks, and addressing the diverse needs of communities with varying levels of capacity and resources (Cook & Fallon, 2016). Additionally, the effectiveness of these funds can be influenced by external factors such as economic fluctuations and changes in government policy, which may affect the availability of resources for community projects (Cook & Fallon, 2016). As such, ongoing evaluation and adaptation of funding strategies are essential to maintain the relevance and effectiveness of Community Benefit Funds in Wales.

Advantages of community benefit funds

- 5.36 Community benefit funds (CBFs) serve as a vital mechanism for enhancing the well-being of local communities by providing financial resources that can be utilised for various development initiatives. These funds, often sourced from public or private entities, are

designed to address specific community needs, promote social equity, and foster sustainable development. The benefits derived from CBFs can be extensive, impacting health, education, infrastructure, and overall community resilience.

- 5.37 One of the primary advantages of CBFs is their ability to support health promotion initiatives. Community-driven health promotion programs funded through CBFs can significantly enhance public health outcomes. Research indicates that community granting programs can mobilise local resources to address pressing health issues, such as chronic diseases, maternal health, and mental well-being (Clark, 2024; Kaplan & Gourevitch, 2020). These programs often engage community members in the planning and implementation processes, ensuring that the initiatives are tailored to the specific needs of the population. This participatory approach not only increases the effectiveness of health interventions but also empowers community members by involving them in decision-making processes (Clark, 2024; Kaplan & Gourevitch, 2020).
- 5.38 Moreover, CBFs can play a crucial role in economic development by providing funding for local businesses and initiatives that stimulate job creation. Community-based venture capital initiatives can enable local entrepreneurs to access the necessary capital to start or expand their businesses, thereby fostering economic stability and growth within the community (Auken, 2002). Additionally, funds allocated for infrastructure development, such as roads, schools, and healthcare facilities, can enhance the quality of life for residents and attract further investment into the area (Nasution, 2023; Makwai, 2023). This is particularly evident in rural areas where access to basic services is often limited, and CBFs can bridge these gaps effectively (Karim et al., 2021).
- 5.39 The environmental benefits of CBFs should also be highlighted. Many community benefit funds are directed towards sustainability projects, such as reforestation, conservation, and renewable energy initiatives. These projects not only contribute to environmental preservation but also create economic opportunities for local communities through eco-tourism and sustainable resource management (Schubert, 2024; Ferreira et al., 2019). For instance, funding for community-led conservation efforts can enhance biodiversity while providing livelihoods for community members involved in these initiatives (Schuett et al., 2016). The integration of environmental sustainability into community development plans is essential for ensuring long-term resilience against climate change and other ecological challenges.
- 5.40 Furthermore, CBFs can enhance social cohesion and community engagement. By funding initiatives that promote social interaction, such as community gardens, sports programs, and cultural events, these funds can foster a sense of belonging and collective identity among residents (Ramsden, 2021; Rose et al., 2022). Research has shown that community participation in funded projects leads to stronger social networks and improved mental health

outcomes, as individuals feel more connected and supported within their communities (Tamminen et al., 2014; Kelly et al., 2021). This social capital is crucial for building resilient communities that can effectively respond to challenges and leverage opportunities for growth.

- 5.41 However, the effectiveness of community benefit funds is contingent upon several factors, including transparency, accountability, and community involvement in the fund management process. Studies have indicated that when communities are actively engaged in the governance of these funds, the outcomes are significantly more positive (Kasimba & Lujala, 2019; Sasongko et al., 2021). It is essential for funders to establish clear guidelines and frameworks that promote equitable distribution of resources and ensure that the funds are utilised in alignment with community priorities (Reginaldis, 2024; Kaplan & Gourevitch, 2020). Additionally, ongoing evaluation and feedback mechanisms should be implemented to assess the impact of funded initiatives and make necessary adjustments to improve effectiveness (Deeming et al., 2022; Diaz et al., 2018).

6. RECOMMENDATIONS

- 6.01 Infrastructure projects should not solely prioritise economic gains but also prioritise social considerations and community well-being. Engaging stakeholders, particularly local communities, ensuring equitable benefit-sharing, and promoting transparency are crucial for maximising the positive impacts of infrastructure development while mitigating potential negative consequences.
- 6.02 Integrating social sustainability considerations from the project's inception is paramount. This involves conducting thorough social impact assessments throughout the project lifecycle to anticipate, address, and minimise potential negative consequences for communities.
- 6.03 The literature suggests that community engagement should be viewed as an ongoing process rather than a one-time event. It is important to understand the evolving nature of community engagement and the need for longitudinal approaches to assess engagement effectiveness. This perspective is crucial for ensuring that community engagement efforts remain relevant and responsive to changing community dynamics.
- 6.04 Actively involving stakeholders, particularly community members, in the decision-making process is essential for ensuring that infrastructure projects align with local needs, expectations, and values, ultimately fostering more socially sustainable outcomes.
- 6.05 Infrastructure projects should strive to distribute economic benefits fairly among communities. This can involve mechanisms like Community Benefit Funds (CBFs), which provide financial contributions to host communities, ensuring they directly benefit from the projects.
- 6.06 CBFs serve as a vital mechanism for enhancing the well-being of local communities by providing financial resources that can be utilised for various development initiatives. These funds, often sourced from public or private entities, are designed to address specific community needs, promote social equity, and foster sustainable development. The benefits derived from CBFs can be extensive, impacting health, education, infrastructure, and overall community resilience.
- 6.07 CBFs can play a crucial role in economic development by providing funding for local businesses and initiatives that stimulate job creation. Community-based venture capital initiatives can enable local entrepreneurs to access the necessary capital to start or expand their businesses, thereby fostering economic stability and growth within the community. Additionally, funds allocated for infrastructure development, such as roads, schools, and healthcare facilities, can enhance the quality of life for residents and attract further investment into the area. This is particularly evident in rural areas where access to basic

services is often limited, and CBFs can bridge these gaps effectively.

- 6.08 Furthermore, CBFs can enhance social cohesion and community engagement. By funding initiatives that promote social interaction, such as community gardens, sports programs, and cultural events, these funds can foster a sense of belonging and collective identity among residents. Research has shown that community participation in funded projects leads to stronger social networks and improved mental health outcomes, as individuals feel more connected and supported within their communities. This social capital is crucial for building resilient communities that can effectively respond to challenges and leverage opportunities for growth.
- 6.09 However, the effectiveness of CBFs is contingent upon several factors, including transparency, accountability, and community involvement in the fund management process. Studies have indicated that when communities are actively engaged in the governance of these funds, the outcomes are significantly more positive. It is essential for funders to establish clear guidelines and frameworks that promote equitable distribution of resources and ensure that the funds are utilised in alignment with community priorities. Additionally, ongoing evaluation and feedback mechanisms should be implemented to assess the impact of funded initiatives and make necessary adjustments to improve effectiveness.

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