

Participation in Decarbonization by Equity-deserving Groups

A Comparative Analysis of Canada and the United
Kingdom





The Diversity Institute conducts and co-ordinates multidisciplinary, multi-stakeholder research to address the needs of diverse Canadians, the changing nature of skills and competencies, and the policies, processes, and tools that advance economic inclusion and success. Our action oriented, evidence-based approach is advancing knowledge of the complex barriers faced by equity-deserving groups, leading practices to effect change, and producing concrete results.



The Environmental Change Institute (ECI) at the University of Oxford is an internationally recognized centre for interdisciplinary research on environmental change. ECI brings together expertise across climate, energy, ecosystems, food systems, and governance, fostering collaboration between academia, policy, and practice. A particular strength lies in its pioneering work on energy demand and the transition to a zero-carbon economy, including initiatives that support small and medium-sized enterprises (SMEs) through research, tools, and policy engagement. ECI is also a leader in advancing green skills, with projects focusing on the construction sector and beyond, exploring the development of technical, employability, and sustainability skills essential for SMEs to thrive in a net zero future.



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Executive Summary

Background

Small and medium-sized enterprises (SMEs) make up the majority of businesses and account for half of greenhouse gas emissions in both Canada and the United Kingdom (UK). However, policies aimed at reducing greenhouse gas emissions and supporting commitments to transitioning to net zero, often do not address their specific needs. SMEs vary considerably in terms of size, sector and to support transition planning and implementation. In both countries, women and immigrant populations play important roles in the entrepreneurship landscape and in Canada, Indigenous peoples are also gaining ground. There is also evidence to suggest that SMEs led by Indigenous peoples, women, immigrants and other equity deserving groups have particular needs as well as unique approaches.

In both Canada and the UK there are data gaps – there are insufficient data on SMEs’ environmental impacts, and these are rarely disaggregated for SMEs led by Indigenous peoples, women, immigrants and other diverse groups. Technical challenges in enumerating emissions, insufficient financial support systems, perceived distrust of emissions disclosure frameworks are particularly acute.

Tailored policies to SMEs with an EDI lens can help realize inclusive green governance, reduce barriers on capital, skills and capacity to decarbonization, and reduce adverse climate change impacts. However, data are needed to enable policy makers to tailor strategies to diverse SMEs and to determine what works for whom.

Objectives and methods

This project provides a comparative review of SMEs in Canada and the UK with a focus on SMEs owned by Indigenous peoples, women, immigrants and other equity deserving groups and their implications for policy and governance. Specifically, this study asks the following questions:

1. What role do SMEs play in decarbonization in Canada and the UK?
2. What are the barriers and enablers for them in transition planning?
3. What is the role of SMEs owned by Indigenous peoples, women, immigrants, racialized people and others? Do they have unique needs and capabilities to support decarbonization?
4. How to policies in Canada and the UK support decarbonization efforts by SMEs and do they address the unique needs of capabilities of SMEs owned by equity deserving groups?
5. How can we improve evidence informed inclusive strategies to advance decarbonization?

This report is a synthesis of published literature and data on SMEs and decarbonization including academic research, industry and government reports. We conducted a comparative analysis of the most recent publicly available decarbonization data for diverse SMEs in Canada and the UK from anonymized secondary data. We synthesized census data from government repositories on SMEs’ progress on decarbonization, with a more specific focus on considerations of EDI. We used data provided in reports and data files on how diverse SMEs are adopting decarbonization. In some

instances, we supplemented data on general trends in SME decarbonization using secondary peer-reviewed research, industry, and government reports (e.g., multinational governance organizations like the OECD through to regional and local governance entities) as well as primary data from relevant SME support programs (e.g. UK's ERDF LoCASE dataset). Specifically, we analyzed SMEs' progress to decarbonization by equity-deserving or ethnic group in majority-ownership characteristics, by sector, by enterprise size, and by region (i.e., across the rural and urban divide).

Results

In both countries, SMEs account for a significant proportion of businesses and employment but are often peripheral to discussions of decarbonization, although the UK has advanced this in recent years. Data collected in Canada and the UK use different categories and we found limited opportunity for direct comparison. At the same time, in both countries, women owned businesses and businesses owned by other equity deserving groups are growing in importance. In Canada, businesses owned by Indigenous peoples are one of the fastest growing segments of the economy. Despite asymmetry, data suggest majority-owned SMEs by Indigenous Peoples, women and equity-deserving groups tend to emphasize environmental values more than other SMEs. Available evidence also suggests diverse SMEs face many of the same financial, social, cultural, geographic, and sub-sector barriers that lead to variable adoption rates for decarbonization, but nuances exist, in part because of sectoral concentrations, and should be explored further and addressed through policy interventions. Together, technical skills training, with context-specific wraparound support and funding is needed to support diverse SMEs to decarbonization.

Across sectors, decarbonization of SMEs in Canada and the UK is variable, warranting context-specific interventions. UK SMEs lead in adoption of decarbonization over Canadian SMEs in all sector categories, likely due to a structured regulatory landscape and sector-specific support. In Canada, diverse SMEs are less involved in production, construction and resource sectors, yet these sectors lead in decarbonization adoption. In service-based sectors - where diverse SMEs comprise a greater proportion – progress towards climate goals has been slower. In contrast, UK SMEs in the service sectors lead in emissions reduction, with lower decarbonization participation in construction and resource-intensive sectors.

Across business size, data are particularly limited and not as comparable. In general, the adoption of clean technologies for operational sustainability tends to scale with organizational capacity. Larger organizations tend to have the capital, resources, and specialized expertise to adopt and implement decarbonization solutions within their enterprises. Canada measures decarbonization for diverse-owned SMEs with a survey of technical intervention adoption, where UK analysis employs more attitudinal and behavioural responses. In many cases, diverse SMEs tend to be smaller enterprises, highlighting a need for diversified skills training and capacity support for these diverse majority-owned enterprises.

Regional differences in majority-ownership characteristics emerge between rural and urban firms. Rural SMEs tend to be less diverse than urban SMEs in both countries, operated by primary decision makers with more experience and less education than the primary decision makers in urban SMEs.

Rural SMEs are also more likely than urban SMEs to be equally owned or majority male-owned, as well as less likely to be majority owned by visible minorities or person(s) with a disability, and more likely to be majority owned by Indigenous people. These shape unique context specific supports for diverse enterprises to engage in decarbonization. In Canada, rural firms tend to outperform urban, more diverse firms in the use of decarbonization interventions, with inverse adoption patterns observed in the UK. However, limited disaggregated data are available to parse whether this is due to sector-specific trends in regions. Nevertheless, the data demonstrate that a variety of skills and capital-based support is needed to ensure that equity-deserving groups can start and sustain successful, low carbon enterprises in rural environments.

Conclusions and implications

Several insights emerged from our comparative evaluation. First, a gender and multi-faceted diversity lens should be applied to emissions and decarbonization policies, governance, and practices; recognizing the role of historic assumptions and differentiated capacities. This includes gender diversity in boards or leadership roles, and ensuring concerted wraparound support exists for women entrepreneurs and employees, who are often more exposed to the impacts of climate change given their community and family responsibilities.

Second, disaggregated data collection for emissions and decarbonization participation should be refined; majority-ownership characteristics and workforce composition need to be better reflected in Canadian and UK censuses, enabling more context-specific interventions. The absence of data on emissions reporting across diverse SME demographics means policies are unable to include target support to address gaps and specific needs of underrepresented populations.

Third, policies should be geared toward addressing regional, sectoral, and majority-ownership barriers that shape SMEs' decarbonization pathways; these can include more targeted support for those regions, sectors, or owner-demographic SMEs needing more specialized support for decarbonization.

Fourth, the design of targeted SME support programs should prioritize co-creation with multi-level governments and local partners, periodic evaluation embedded through structured mechanisms, and iterative policy development, with policy narratives emphasizing the long-term value of diverse SME decarbonization. This allows SMEs to respond to shifting market landscapes, such as developments in value chain requirements and consumer pressures (e.g., Carbon Disclosure Project), requirements from financial institutions and lenders (TCFD, OFSI-B15) and governments (e.g., CSBS, CSSB, EU CBAM).

The paper also identifies a range of opportunities for further research to inform evidence-based strategies to advance our net zero goals.

Background

Context

Despite recent shifts in priorities, the governments of Canada and the UK remain committed to realizing net-zero. Realizing these ambitions require seeking emissions reductions through offsetting or processing of all greenhouse gases (including methane and nitrous oxide) across the entire value chain including what the company produces itself; what results from its use of the energy grid; and the indirect impacts of the use and consumption of its products or services (Scope 1, 2, and 3).¹

At present, small and medium-sized enterprises (SMEs) make up a substantial proportion of all businesses and emissions in both Canada and the United Kingdom (UK) and are essential actors to realize market decarbonization. In Canada, SMEs comprise more than 99% of enterprises and are defined by having 1-499 employees.² In the UK, SMEs also comprise about 99% of the number of enterprises and 60% of private sector employment. Canada defines SMEs based on the number of employees – companies with fewer than 500 employees while the UK designs SMEs as enterprises with fewer than 250 staff, less than or equal to £44m in annual turnover, or a balance sheet total of less than or equal to £38m.³ In Canada, SMEs are responsible for nearly 52% of all greenhouse gases, or 42% of Canada’s net emissions (when subtracting absorbed gases via natural sinks or technology),⁴ while UK SMEs contribute about 50% of all greenhouse gasses, or 37% of the country’s net emissions.⁵ As table 1 illustrates, in both countries, solopreneurs, or companies without employees dominate the space (72.8 % versus 75.1%) and remaining SMEs have fewer than twenty employees. In both countries fewer than 0.1% of businesses have more than 500 employees, in stark contrast to other economies like the USA. This has significant implications for the development and implementation of strategies to address greenhouse gas emissions.

Table 1. Business size distribution for Canada and UK (2025)^{6, 7, 8}

	Canada		UK	
	Number	Percentage (%)	Number	Percentage (%)
Non-employer	3,667,853	72.8%	4,272,535	75.1%
1–4 employees	775,662	15.4%	886,705	15.6%
5–9 employees	249,061	4.9%	264,170	4.6%
10–19 employees	167,219	3.3%	142,500	2.5%
20–49 employees	113,364	2.2%	77,585	1.4%
50–99 employees	39,070	0.8%	26,020	0.5%
100–199 employees	16,284	0.3%	10,205	0.2%
200–499 employees	7,930	0.2%	6,500	0.1%
500 employees or more	3,519	0.1%	4,045	0.1%

* Note: UK government statistics denote that while “SMEs” stands for ‘small and medium enterprises,’ this is always taken to include micro businesses and non-employers.⁹ In Canada, divisions are typically only made among small, medium and large enterprises, with some definitions employing micro-sized firms as a subcategory of small businesses.¹⁰

Regulatory frameworks and governance

While SMEs are numerous and contribute significantly to emissions in both regions, government net-zero policies often target large enterprises, with little support for SMEs.^{11, 12, 13} Similarly, emissions reporting standards and frameworks are often geared towards large enterprises with in-house capacity for emissions monitoring, reporting, and innovation across emission scopes.¹⁴

In contrast to jurisdictions like Taiwan, where the government has implemented comprehensive carbon reduction approaches by sector, Canadian and UK SMEs often feel marginalized with respect to climate policies,¹⁵ face disproportionate impacts from climate change, and have limited skills and capacities to achieve decarbonization goals. In both Canada and the United Kingdom there have been growing pressures to address sustainability and, until recently, there were expectations of growing regulation.

In Canada, for example, SMEs operating in some sectors have regulatory, reporting and compliance requirements while those operating in others have none.

With Brexit, the UK requirements have shifted although there are continued demand through the Carbon Disclosure Project (CDP), regulatory requirements such as the EU Carbon Border Adjustment Mechanism (CBAM,) a carbon emissions pricing tool, Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD) and lender-specific requirements such as Canada’s Office of the Superintendent of Financial Institutions - B15 or the Task Force on Climate -related Financial Disclosures (TCFD).

Small and medium-sized enterprises in general report financing, skills and competing priorities as the biggest impediments to adopting decarbonization. For instance, in a 2020 study by Canada’s Smart Prosperity Institute, of the 99 identified federal and provincial policies on climate change mitigation in Canada, only five were targeted toward SMEs.¹⁶ There are some programs targeting aspects of the process - for instance, the Sustainable Development Technology Fund (SDTC), is a not-for-profit foundation established to fund the development and demonstration of new technologies that promote sustainable development¹⁷ but for many SMES, technology is not the principal impediment. The Climate Action Incentive Fund (CAIF) SME Project Stream (2019–2021) aimed to help reduce emissions and incorporate consumer-level efficiency upgrades¹⁸ but there has been limited analysis of their reach across sectors or to SMEs led by Indigenous peoples and equity deserving groups. Similarly, while Canada’s National Research Council - Industrial Research Assistance Program (NRC IRAP) does require SMEs to show quantifiable environmental benefits and baselines, prior to funding decarbonization technology financial support, its reach is relatively limited again with a focus on technological developments.¹⁹

Another factor affecting the adoption of strategies to address transition is the concerns about economic dislocation, which have been attenuated in recent years and shifted focus to notions of “just

transition” in order to accommodate the real threat of massive disruption of employment in specific sectors. In Canada, a focus on “mid career transitions” in the skills sector was motivated in large part by the threats of massive disruption in the energy sector with programs, for example, aimed at transitioning highly paid oil patch workers to emerging jobs in the information, communications and technology sector - a shift that has since been reversed.²⁰ Existing Climate Change Agreements, which provide levy discounts in return for efficiency commitments, are largely confined to energy-intensive, predominantly larger firms. Although smaller firms are exempted from some policies, they are also excluded from access to structured incentives, data, and learning opportunities. The UK’s Climate Change Committee report to Parliament in 2025 included a strategy to support skills, noting the need for the Office for Clean Energy Jobs and Skills England to develop a strategy to support diverse workers in sectors which need to grow or transition and in communities that may be adversely impacted.²¹

Diversity among small and medium-sized enterprises

SMEs are by no means homogenous and structural differences – size, sector, location, ownership -can have significant impact on their ability to embrace green transition. In addition, there is evidence of differences in the priority ascribed to environmental issues among certain demographic groups and for this reason, bringing a gender and diversity lens to our understanding of policies and programs aimed at advancing green transitions is important.

In Canada women owned 20% of SMEs and are partners in an additional 17% have shared ownership, many of them family businesses and farms. These businesses tend to be smaller, concentrated in

Case studies: Women entrepreneurs and the Path to Net-Zero¹

Coralus (formerly SheEO) is a non-profit organization that uses a unique model to distribute crowdfunding support to ventures owned by women and nonbinary entrepreneurs. Coralus brings together community members known as “Activators” who contribute to a collective Perpetual Fund which provides interest-free loans to ventures which have commitments to sustainable development goals. The loans have low default rates ensuring an evergreen source of capital. In partnership with Coralus, the Diversity Institute undertook an in-depth qualitative analysis of the role of women entrepreneurs in advancing Canada’s net-zero goals through interviews with 43 women entrepreneurs.¹ While considerable attention has been paid to women in the green tech sector, much less attention has been focused on the environmental practices of women across other sectors. The ventures examined included women in industries such as waste management and agriculture focused on developing innovative business processes and technologies but also included women in other sectors focused on reducing their scope 1, 2, and 3 emissions through the value chain. These “greenpreneurs” highlighted the barriers and enablers to achieving their goals as well as the skills and supports that they need to carry out their business visions. The study highlighted that while science, technology, engineering and math (STEM) skills are critical in some sectors and some roles, the critical needs were for more interdisciplinary skills to support the development and implementation of green transition strategies and processes.

services sectors and undercapitalized compared to other businesses.²² In the UK, 14% of SMEs are women led (having majority women ownership), with a further 26% having equal ownership/directorship. % of SMEs. Similarly to Canada, women-owned businesses are smaller and more service oriented than those owned by men.²³ In Canada, SMEs majority owned by women are well represented in retail trade (17.1% of enterprises), professional, scientific and technical services (17.4%), and service sectors (11.8%). Among the other sectors category, women and racialized people are frequent majority-owners (32.4% and 21.8%, respectively). Research in Canada also shows that women are more likely to prioritize environmental and social values as business priorities and this is true of Canadian women entrepreneurs.²⁴

In the UK, women-led SMEs are most likely to work in health/social work (25% of enterprises), education (34%), professional/scientific (19%), and accommodation/food (19%).

In Canada racialized people account for 26.3% of the population and own 27.6% of enterprises. Racialized business owners are most prevalent in the professional, scientific and technical services sector (20.8%), construction (12.3), retail trade (11.1%), and accommodation and food services (9%). Ontario and British Columbia have the highest rates of racialized entrepreneurship (37.7% and 35.8% respectively), followed by Alberta (24.7%) and Manitoba (17.8%).²⁵ .²⁶

In the UK 81.7% of censused households in the same year (2021) UK identified as white with 18.3% identifying as racialized or other²⁷ and White ethnic groups account for 93.7% of SME majority-leadership (about 93.7%) and ethnic minorities own 4.9% of all enterprises.²⁸ In the United Kingdom, England has the highest percentage of ethnic minority representation in SME majority-leadership (6.6%), followed by Scotland (3.7%), Wales (2.8%), and Northern Ireland (1.5%).²⁹ By sector, representation is higher for some industries including administrative services (9.1%), transportation and storage (8.2%), accommodation and food (7.8%) as well as professional and scientific services (6.3%).

In Canada, Indigenous (First Nations, Inuit and Metis) represent 5% of the population and about 1.2% of incorporated businesses although many are also self employed given legal and tax issues. Indigenous women are more likely to be entrepreneurs than other women.³⁰ Research has shown that the culture of many Indigenous peoples emphasizes long term thinking - seven generations - and consequently places a high priority on sustainability and community contributions over profits.³¹ Many live in rural and remote areas. Most reserves are located in rural or remote communities, making access to public services and infrastructures, financial services, and education opportunities difficult.³² According to the Auditor General's connectivity report, while 91% of households across Canada meet federal connection speed targets (50/10 Mbps), this figure drops to around 60% in rural/remote areas and only 43% for households on-reserve.³³ Among registered Indigenous SMEs, communities are well represented in construction (28.0%) and retail trade sectors (13.9%). Visible minorities are highly represented in accommodation and food services (14.2%), transportation and warehousing (12.4%), as well as professional, scientific and technical services (16.5%). SMEs led by persons with a disability often include accommodation and food services (16.3%), construction (23.4%) and retail trade (17.5%).

Canadian primary production and extraction sectors have the highest decarbonization adoption rates given their relative high emissions, pressure to lower emissions intensity to maintain global competitiveness, and stringent domestic environmental regulation.³⁴ This is observed in manufacturing (15.7% of enterprises), as well as agriculture, forestry, fishing, hunting, and mining/oil/gas extraction subsectors (12.6% of SMEs in the sector(s)). With the exemption of Indigenous Peoples, these sectors are not constituted by diverse majority-owned enterprises. Service-based industries including information, real estate, administrative support, waste management, health care, as well as arts and entertainment report the lowest decarbonization adoption rates (about 5.2% of enterprises). These sectors are dominated by diverse majority-owned enterprises. Moderate adoption is seen among intermediary services, such as the construction sector (6.7% of enterprises), wholesale trade (7.3%), retail trade (9.1%), and transportation and warehousing (7.7%). Moderate adoption may be due to requirements from connected sectors for decarbonization, which translate throughout the value chain to these supporting sectors.³⁵

In Canada, the differences among sectors involved in decarbonization, and where Indigenous Peoples and equity-deserving groups operate, showcases that diverse SMEs often participate in industries where the pathways to decarbonization are less clear. Canadian SMEs in natural resource, asset-heavy and extractive sectors were investing in decarbonization technologies following the expectation of mandatory compliance and minimum stringency standards, such as those regulated under the CSBS.³⁶ This was partly enabled through investment tax credits in 2024-2026, which provided technology rebates for capital expenditure on clean technology adoption.³⁷ Since this census data were compiled, ESG reporting requirements and funding support have stalled in Canada, and many SMEs face unclear efficiency expectations for natural resource sectors.³⁸ For the diverse SMEs in these sectors, more explicit support for funding acquisition and supply chain diversification may be needed to enable them to realize decarbonization; furthermore, support for the sectors in which they dominate is needed.

In the UK, data on SME composition by sector only differentiates by whether the operator is or is not an ethnic minority. In general, ethnic groups are well represented in administrative services (9.1% of enterprises), information & communication sectors (8.5%), transport and storage sectors (8.2%), as well as accommodation and food service sectors (7.8%).

Despite the universality of climate change, research has suggested that the magnitude of climate change impacts are unevenly amplified among equity-deserving groups (such as women, minority ethnic groups, and Indigenous Peoples),³⁹ and their businesses, culminating in unequal capital, resources, and capacity to adopt decarbonization as a response.⁴⁰ While SMEs owned by equity-deserving groups are often more likely to engage in green initiatives given their pro-environmental and pro-social alignment,⁴¹ they often lack targeted support in policies, and must navigate uncertain regulatory requirements with reduced organizational capacities. This includes lacking the skills to accurately enumerate emissions across scopes or the capital to purchase and adopt technologies.

Challenges to decarbonization

Many SMEs have articulated feeling increased pressure to adopt sustainable practices due to regulatory frameworks - the Canadian Sustainability Standards Board (CSSB) in Canada, Carbon Board

Adjustment Mechanism (CBAM) in the EU , stakeholder demands (through Carbon Disclosure Project, for instance), and from financial lenders (e.g., Office of the Superintendent of Financial Institutions (OSFI)-B15 in Canada.⁴² This external pressure has encouraged SMEs to engage in sustainable practices and collaborate with stakeholders to overcome market and financial challenges, which is relevant for understanding how SMEs in different countries approach decarbonization.⁴³ More recently, SMEs are contending with increasing uncertainty in standards following changing disclosure requirements across regions, delayed timelines, as well as variable consumer preferences, ranging from demands for sustainability compliance to disassociation from environmental, social and governance (ESG) and Equity Diversity Inclusion and Accessibility (EDIA) commitments.⁴⁴ To navigate uncertainty, SMEs need improved capital, skills, and capacity to engage in net-zero practices, disclosures, and broader ESG materiality topics. It also changes the configuration of business support systems SMEs may be accessing to realize decarbonization requirements. Together, these strain the capital, skills, and capacities of diverse SMEs to navigate complex soft and hard regulations for decarbonization.⁴⁵

While many transnational financial institutions have withdrawn from the Net-Zero Banking Alliance (NZBA) many Canadian and UK banks are still increasing their sustainable finance targets and the number of green bonds. Recent data across S&P 500 indexes,⁴⁶ pension funds,⁴⁷ and private equity,⁴⁸ all indicate sustained progress for ESG disclosure. While remaining a priority, Tory's LLP 2026 data suggest the number of Canadian SMEs with a net-zero target has decreased from 45% to 39%, since 2025.⁴⁹ In Canada, changes to Bill C-59 anti-greenwashing legislation has made it tougher for SMEs to make sustainability, decarbonizations or emissions claims without technical evidence to support: while ensuring the integrity in reporting and advertising, stringent requirements for claims compliance reduce SMEs willingness to participate owing to financial risk from potentially making an incorrect claim.⁵⁰ Despite the general backlash and retreat on climate pledges from large financial institutions in the UK, the overall trend in the UK is towards more, not less regulation, and increased accountability for businesses. Data collected by the British Business Bank between 2023 and 2024 show decarbonization adoption steadily increased for most SMEs and large enterprises,⁵¹ despite rollback pressures. The challenge for SMEs becomes a skills issue to navigate uncertainty, identify procurement opportunities, and seek out funds which may not be explicitly linked to decarbonization but still applicable. The lack of funds and changing regulatory requirements confuses many SMEs in terms of what decarbonization data they need to collect, and how they can use them.

Capital and capacity barriers to decarbonization include the cost of new materials and infrastructure, changes to suppliers and value-chains, investments into data collection and compilation, in addition to personnel costs to realize disclosure reporting, and upskilling or reskilling workers for operational changes related to decarbonization functions. In Canada, about 49% of surveyed SMEs cite a lack of capital as their biggest barrier to taking action,⁵² and many report insufficient enterprise support and wraparounds to advance organizational sustainability through procurement (i.e., purchasing energy-efficient appliances) and participation in skills training.⁵³ In the UK, about 35% of SMEs similarly perceive cost as the major obstacle to decarbonization, and many note the existing financial levers (existing green loans, grants, and specialized lending) are insufficient, challenging and time-consuming to apply to, and many are simply unaware of specialized financial support and systems.⁵⁴ Implementing increasingly progressive decarbonization initiatives is a capital and capacity dependent process.

Survey data on UK SMEs indicates that the use of energy efficient technologies is much lower among sole proprietors (29.0% of enterprises) and increases commensurate with enterprise size to small- (40.0%) and medium-sized enterprises (56.0%).⁵⁵ This is consistent with research insights among Canadian enterprises. Implementing decarbonization is also a skills challenge, as technologies and solutions are numerous but often require specialized knowledge, which disproportionately burdens SMEs where owners and operators occupy intersectional enterprise functions. This necessitates a unifying competency framework across sectors.⁵⁶

Decarbonization data in Canada and the United Kingdom

In general, there is a lack of data on decarbonization for SMEs,⁵⁷ and especially diverse SMEs. SMEs are often exempt from regulation due to their smaller carbon footprints and limited resources, and where compliance is optional, many diverse SMEs opt not to collect enterprise emissions data given the capital and skills challenges with enumerating emissions across scopes.⁵⁸ This occurs despite diverse SMEs being more pro-environmentally aligned, and despite potential energy savings associated with regulatory compliance.⁵⁹

Where emissions data exist, there remain data gaps within specific sectors, across enterprise sizes, and by ownership characteristics.⁶⁰ In Canada, the National Inventory Report projects annual GHG emissions (as carbon-dioxide equivalents, or CO₂e) across all sectors of the economy. However, it does not differentiate emissions by business size or ownership characteristics.

Industry-level data exists in the Canadian Energy and Emissions Data Centre, but this relies on data predominantly from large enterprises downscaled to Canada's numerous diverse SMEs. Unfortunately, emissions projections do not scale down to SMEs accurately, as energy use and costs often mirror domestic consumers rather than larger businesses with extensive logistics, enterprise portfolios, and supplier value chains.⁶¹ Data collection is mandatory in some sectors, such as resource-intensive manufacturing industries (e.g., metal, textiles, chemical and petrochemical industries, resource processing), but gaps persist in non-energy intensive enterprises (e.g., services, hospitality), where diverse majority-owners are well represented.⁶² In the UK, emissions datasets are disaggregated by sector, region, and enterprise size, but rarely include details on majority-ownership demographics.⁶³

Objectives and Methods

This study aims to compare the progress towards net-zero technology adoption, decarbonization, and emissions data collection across Canada and the UK with a focus on diverse SMEs. Further, we seek to understand how progress intersects with SME enterprise size, governance, as well as the characteristics of owners including women, Indigenous peoples, immigrants, racialized and minority ethnic groups and others)

This study aims to explore the following questions:

1. What role do SMEs play in decarbonization in Canada and the UK?
2. What are the barriers and enablers for them in transition planning?
3. What is the role of SMEs owned by Indigenous peoples, women, immigrants, racialized people and others? Do they have unique needs and capabilities to support decarbonization?
4. How do policies in Canada and the UK support decarbonization efforts by SMEs and do they address the unique needs of capabilities of SMEs owned by equity deserving groups?
5. How can we improve evidence informed inclusive strategies to advance decarbonization?

Methods

This knowledge synthesis provides high-level comparisons between Canada and the UK to understand how SMEs are working towards decarbonization, with a focus on SMEs owned by Indigenous peoples, women, immigrants, racialized and minority ethnic groups and other equity deserving groups. We drew on a range of sources.

1. Using key word searches, we compiled and reviewed academic, policy and industry reports.
2. We accessed and analysed evidence from government surveys, regional economic datasets and census data.
3. For Canada, we also drew on primary data from several studies involving surveys and interviews with entrepreneurs collected with partners such as the Canadian Indigenous Business Council, Coralus, and Bank of Montreal.
4. For the UK, we also used primary data collected from a regional SME grant facilitation program in the UK called "Low Carbon Across the South and East" (LoCASE). This initiative ran from 2016 to 2023, using European Regional Development Funds (ERDF) to provide support for emissions reductions to over 1,200 businesses. Data obtained on supported businesses include their sector, location (by region), and majority-ownership characteristics.

Results

Decarbonization Practices in Diverse SMEs in Canada

Recent data from Statistics Canada (Figure 1) suggests that sustainability practices vary across businesses owned by different groups although some of this may be a result of sectoral segregation.

Figure 1. Small and medium-sized that are majority-led by Indigenous People or equity-deserving groups (columns), across various sectors, in Canada, in 2020,⁶⁴ with the adoption rate of clean tech by the SME sector (Red area)

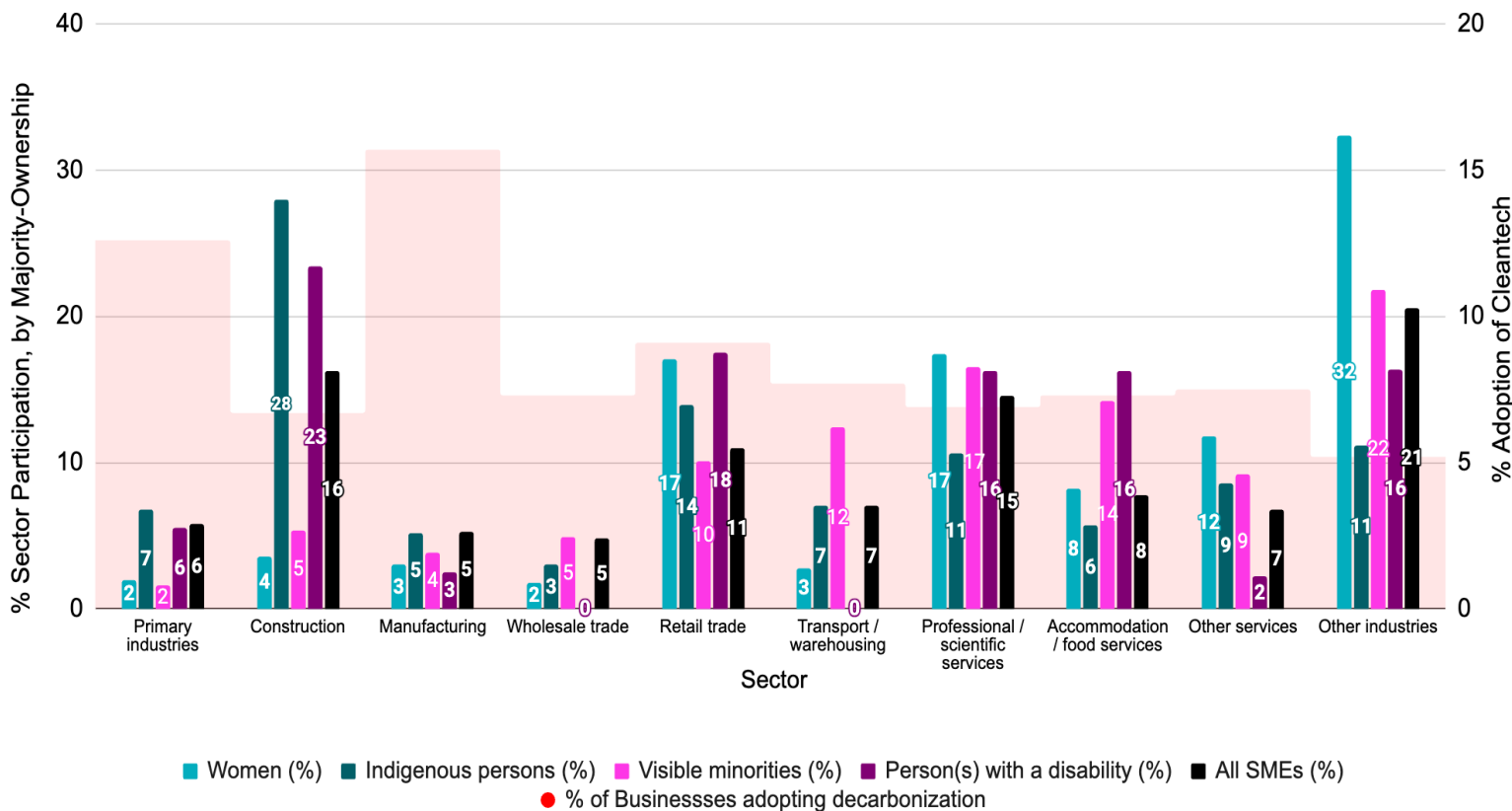


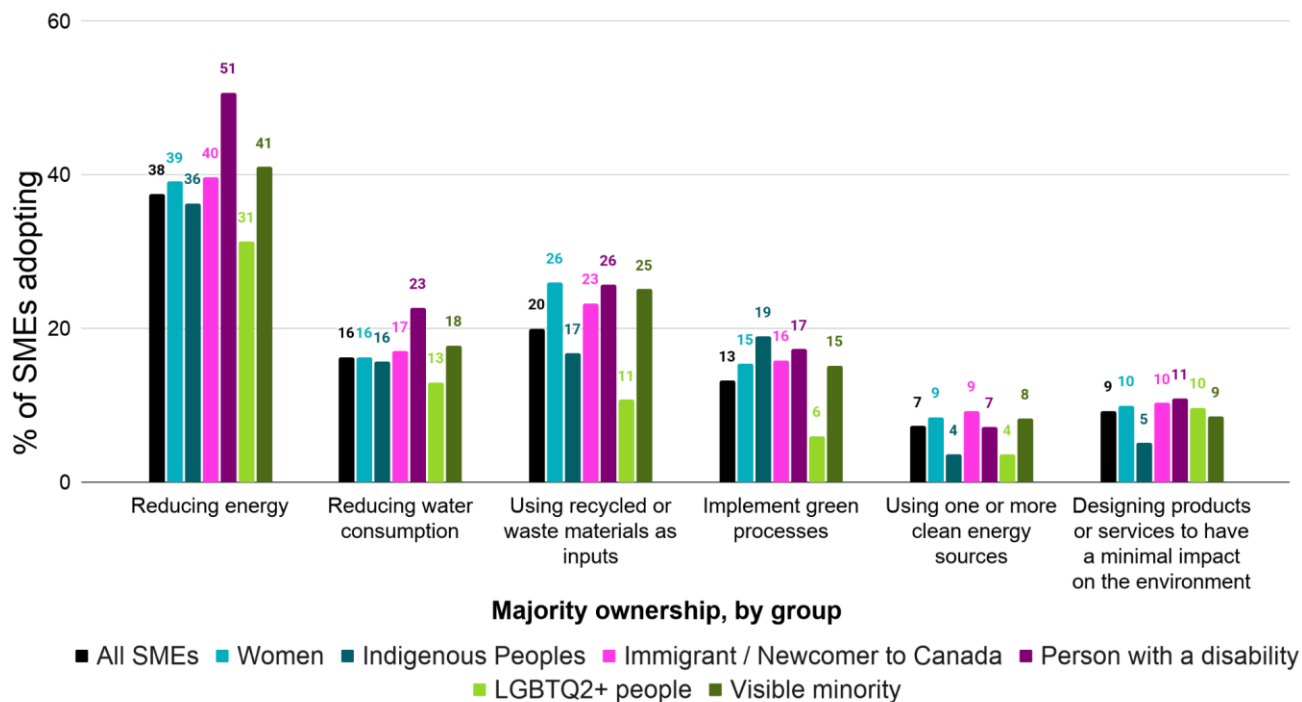
Figure 1 shows that Canadian primary production and extraction sectors have the highest decarbonization adoption rates for example, manufacturing (15.7% of enterprises), as well as agriculture, forestry, fishing, hunting, and mining/oil/gas extraction subsectors (12.6% of SMEs in the sector(s) - given their relatively high emissions, pressure to lower emissions intensity to maintain global competitiveness, and stringent domestic environmental regulation.⁶⁵ Canadian SMEs in natural resource, asset-heavy and extractive sectors were investing in decarbonization technologies following the expectation of mandatory compliance and minimum stringency standards, such as those regulated under the CSBS.⁶⁶ Moderate adoption is seen among intermediary services, such as the construction

sector (6.7% of enterprises), wholesale trade (7.3%), retail trade (9.1%), and transportation and warehousing (7.7%) and may be due to requirements from connected sectors for decarbonization, which translate throughout the value chain to these supporting sectors.⁶⁷ In contrast, service-based industries including information, real estate, administrative support, waste management, health care, as well as arts and entertainment, receive little attention or support and report the lowest decarbonization adoption rates (about 5.2% of enterprises).

Figure 1 also shows the sector participation of businesses majority owned by women, Indigenous persons, racialized people or visible minorities compared to all SMEs varies across sectors. Women and racialized people, for example are less likely to be in primary industries, construction or manufacturing than others and more likely to be in professional and scientific services. Women are more likely to be in retail trade, whereas racialized people are more likely to be in transport and warehousing and accommodation. Indigenous people on the other hand are significantly more likely to be in construction and primary industries. These sectoral differences matter. As primary Industries and manufacturing, for example, are the industries most likely to adopt cleantech solutions. The relationship between structural issues such as the size and the sectors of businesses, the demographic of owners, and sustainability practices add complexity to the analysis.

At the same time, consistent with research suggesting women are more likely to promote sustainable practices.⁶⁸ For example, figure 2 shows that women adopt sustainable input practices slightly more often than other SMEs, particularly when it comes to using recycled materials – 26% compared to 20% across SMEs. Research shows Indigenous business owners are more likely to embrace sustainable practices and to think about long term impacts.⁶⁹ The SME survey shows Indigenous SMEs are more likely to report using sustainable processes than others – 19% versus 13% but lag in other practices.

Figure 2. Participation rate (%) of Canadian enterprises by majority-ownership group, involved in input reduction environmental practices, per Q3 2024.⁷⁰



SMEs owned by a person with a disability were more likely to reduce energy consumption (50.7% of enterprises) and water consumption (22.7%).⁷¹ Other research has suggested that businesses owned by a person with a disability worked to realize sustainability through necessity-driven efficiency, mission-driven operational values, and proactive adaptation to economic challenges.⁷²

Figure 3 shows once again women report slightly higher rates of reducing waste (53% versus 48%) and SMEs operated by persons with a disability showed higher rates in reducing air pollution (33.6% enterprises), reducing waste (63.4%), and carbon sequestration activities (9.4%).⁷³ Immigrants and racialized people are also more likely to focus on waste reduction and reducing air pollution than the average.

Figure 3. Participation rate (%) of Canadian enterprises by majority-ownership, involved in output reduction environmental practices, per Q3 2024.⁷⁴

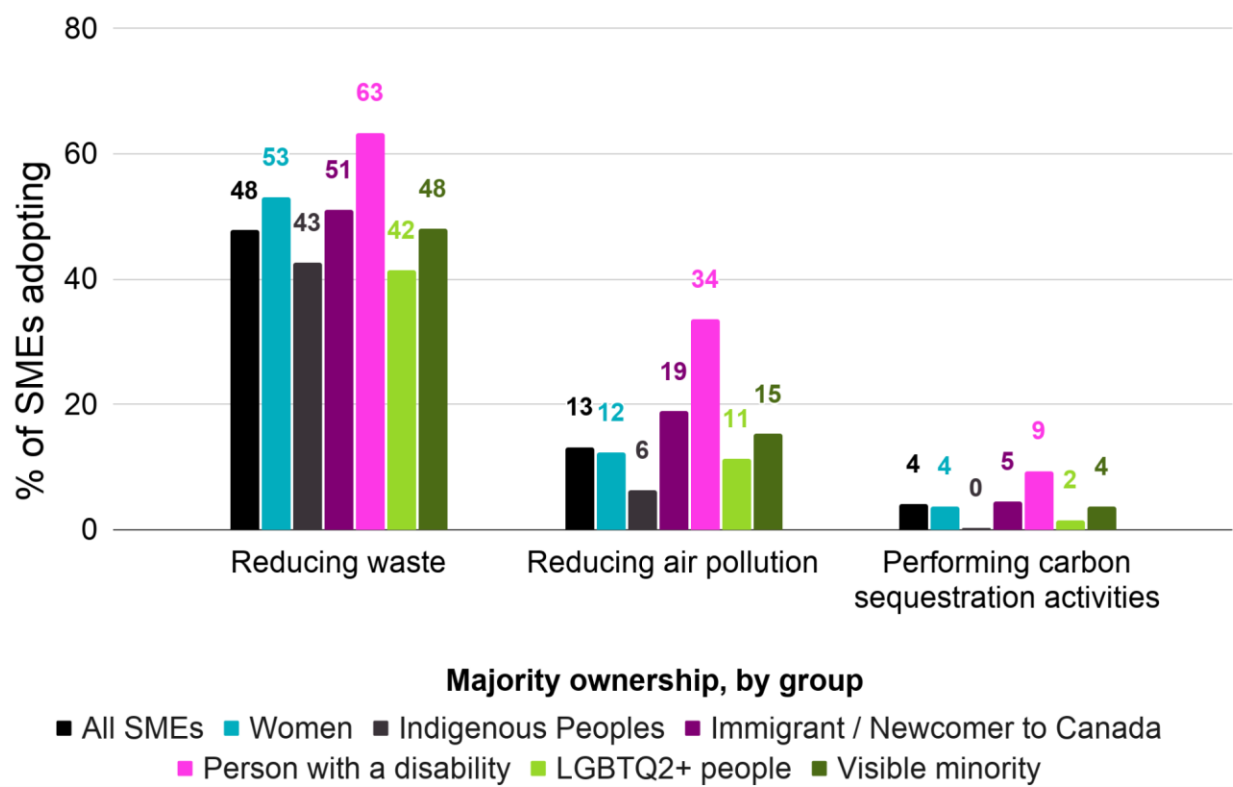


Figure 4 shows women again are more likely to focus on encouraging employees to adopt environmentally friendly policies (39% versus 34%) and to choose suppliers based on their environmental practices (18% versus 12%) while Indigenous peoples are more likely to have written sustainability policies (8% versus 5%). Racialized people and immigrants are slightly more likely to choose suppliers based on their environmental practices and also to focus on zero waste. Enterprises majority owned by a person with a disability are more than twice as likely to choose suppliers based on their practices (26.8% of enterprises), and six times as likely to be zero waste (18.9%).

Figure 4. Participation rate (%) of Canadian enterprises by majority-ownership, involved in policy and procedures for environmental practices, per Q3 2024.⁷⁵

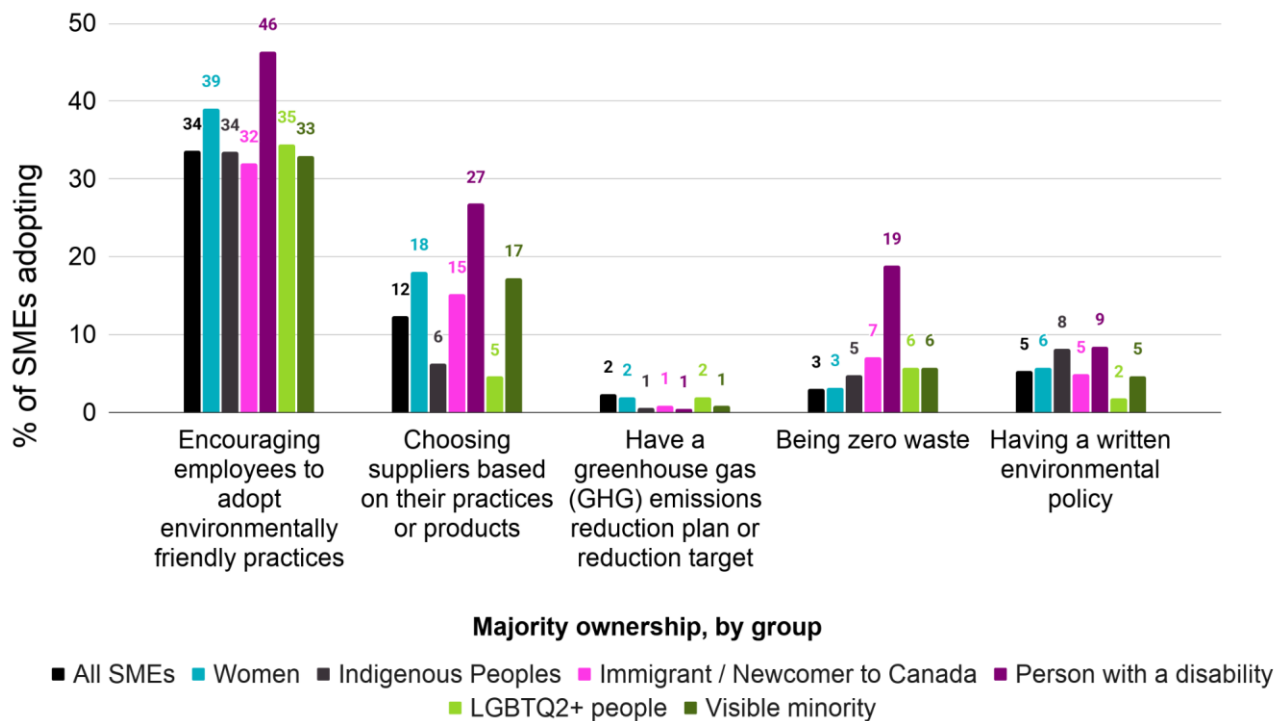
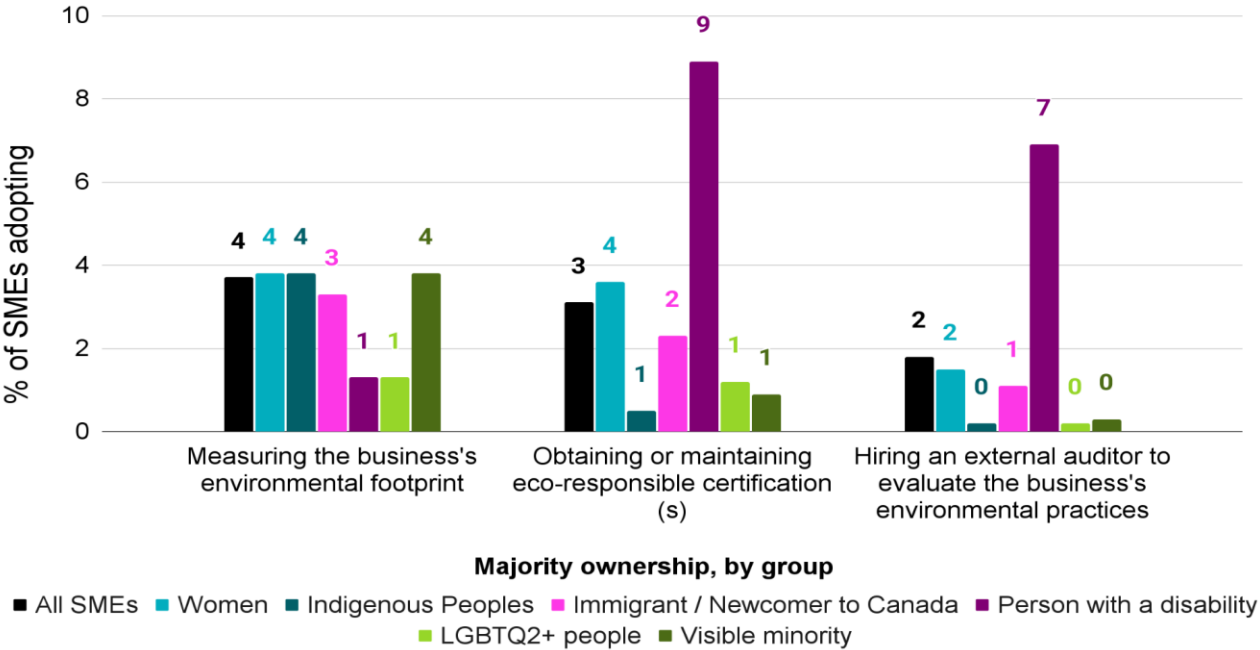


Figure 5 shows the very low focus of measurement and reporting among SMEs in Canada consistent with the absence of legislative requirements. Only 4% of SMEs measured their carbon footprint while 3% obtained certifications and 2% audited their practices. Diverse SMEs generally did not participate in auditing as costs are high for disclosure-compliant carbon accountants, often requiring external auditors and expertise.⁷⁶ In addition, currently there are fewer regulatory requirements or ESG reporting schema that apply to them. Plans for new regulation in Canada have stalled and the complexity and costs of reporting are high.⁷⁷

Figure 5. Participation rate (%) of Canadian enterprises across sizes, involved in auditing for environmental practices, per Q3 2024.⁷⁸



Decarbonization practices among diverse small and medium-sized enterprises in the United Kingdom

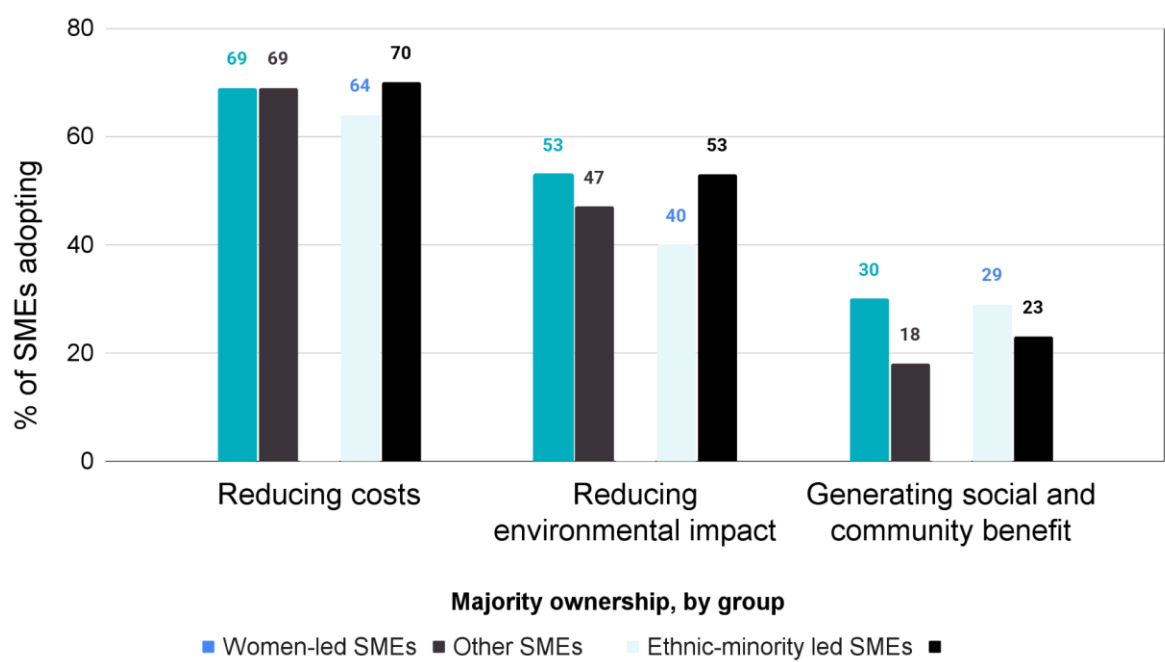
Data between Canada and the UK is not directly comparable. In the UK, census level data on decarbonization practices is not readily accessible or available in a secondary source that gives us such practices disaggregated by personal demographic traits, as there is for Canada. However, the UK does have data on whether diverse SMEs plan to, have, or have no plans to engage in a series of decarbonization activities, ranging from low-capital initiatives to capital-intensive interventions.⁷⁹ Similar to Canadian SMEs, 66.0% of UK SMEs identified capital limits as the primary deterrent to emissions reduction and realizing net-zero,⁸⁰ echoing concerns in the UK census.⁸¹ Insights from individual research on groups can provide some insights into adoption trends across equity-deserving groups.

In the United Kingdom, the available data are limited to actions SMEs are taking emission reductions, broader than clean technology adoption as evaluated in Canada. In general, emissions reduction rates were higher across UK industries than Canadian SMEs. By sector, UK SMEs adopting emissions reduction are opposite to Canadian sectors. In 2021, UK service based-industries in education (57.70%), real estate (56.70%), accommodation and food service (54.10%) lead in adoption of emissions reductions compared to Canadian sectors who lag. This inverse growth may be attributed to the UK's leadership for legally-binding objectives for specific service sectors to accelerate rapid decarbonization technology adoption.⁸²

The available data among UK enterprises shows that women are slightly more likely to focus on reducing environmental impact (53.0% of enterprises vs 47.0%)⁸³ and generating social and community

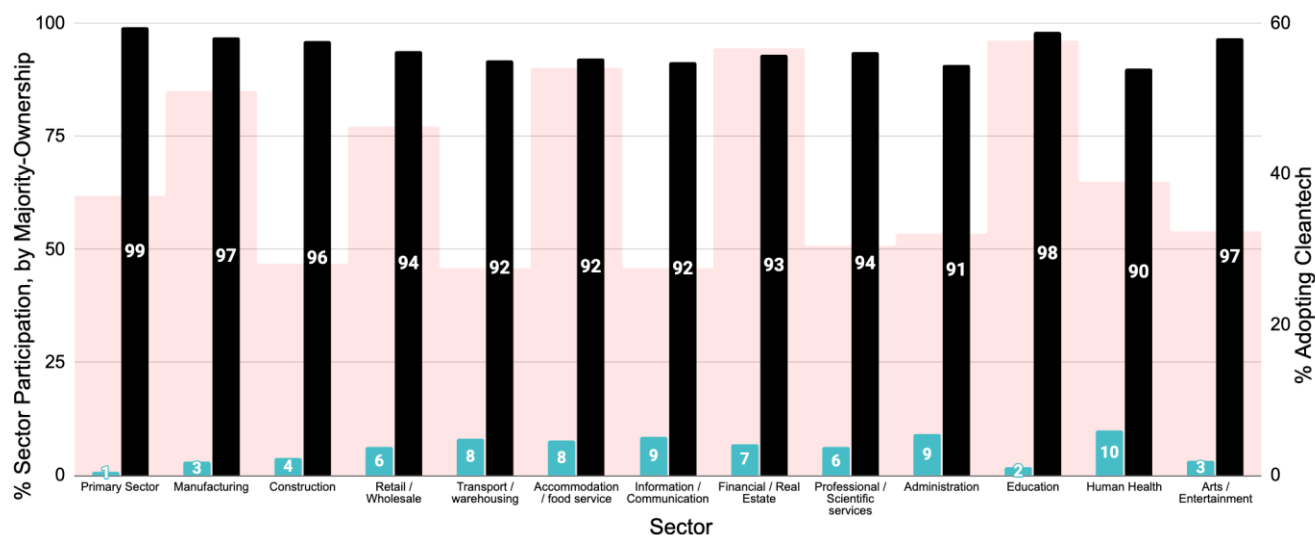
benefit than other SMEs and shows that in ethnic minority led SMEs are slightly less likely to focus on reducing costs or reducing environmental impact but are more likely to report generating social and community benefit (29% vs 23%). by majority-ownership status does support that equity-deserving group-led SMEs are more aligned with decarbonization relative SMEs, see Figure 6.

Figure 6. Surveyed UK SMEs who attribute certain environmental and pro-social behaviour as a business priority, in 2022.⁸⁴



In the UK, data on SME composition by sector only differentiates by whether the operator is or is not an ethnic minority. In general, ethnic groups are well represented in administrative services (9.1% of enterprises), information & communication sectors (8.5%), transport and storage sectors (8.2%), as well as accommodation and food service sectors (7.8%).

Figure 7. Small and medium-sized enterprises that are majority-led by those from an ethnic minority across various sectors (blue column), in the United Kingdom, in 2021,⁸⁵ compared against the SME adoption rate of an emissions reduction activity, by sector (red area) from Office for National Statistics Census 2021 data on UK Business Action on Net Zero and Energy Use, 2021.⁸⁶



■ Majority-led by an ethnic minority (%) ■ Majority-led by non ethnic minority (%) ● Businesses adopting emissions reduction (%)

As shown in Table 2, concurrent incentive programs (such as the ERDF) across sectors have also supported UK SMEs in making greener choices.⁸⁷

Table 2. Sectoral context and makeup of small and medium-sized enterprises receiving European Regional Development Fund grants in Southeast England.^{88, 89}

Sectors	SMEs by sector, by jurisdiction (%)		SMEs applied / received LoCASE grants (%) (N=723)	SMEs receiving LoCASE grants for decarbonization (%) (N=630)
	United Kingdom (%)	England (%)		
Primary sectors*	4	4	1.9	2.2
Manufacturing	6	6	9.5	10
Construction	14	14	2.9	2.7
Wholesale and retail	17	17	7.3	6.8
Transportation and storage	3	3	1.1	1.3
Accommodation and food	10	10	5.2	5.5
Service sectors**	40	43	27.5	28.4
Other service activities	5	5	38.8	37.9

* Note: Primary sectors include agriculture, forestry, fishing; mining and quarrying; electricity, utilities; water management.
 ** Note: service sectors include Information and communication; financial, insurance, and real estate; professional, scientific services; administrative and support services; education; health and social work; arts, entertainment.

In the UK, while there are similar data gaps to Canada, there is some disaggregated data available from some grant programmes such as European Regional Development Funds (ERDF) Based on this, there is some evidence to suggest that women and minority groups apply for and receive grants at a slightly higher rate than their ownership of businesses. As shown in Table 3, women are majority owners of 15% of SMEs in the UK and England but account for 20.7% of the grant applications and 18.9% of the recipients. Similarly, “minority groups” account for 6% of majority owners of businesses but account for 9.8% of applications and receive 9.4% of grants.

Table 3. Population context and proportion of UK small and medium-sized receiving European Regional Development Fund grants that are majority-owned or led by equity-deserving groups.^{90, 91, 92}

Demography	UK population (%)	% of SME population, by region		SMEs applied, received LoCASE grants (%)	SMEs receiving LoCASE grants for decarbonization (%)
		United Kingdom (%)	England (%)		
<i>Gender: Male*</i>	49	64	64	66.5	67.6
<i>Gender: Female*</i>	51	15	15	20.7	18.9
<i>Ethnicity: White**</i>	80.1	89	89	79.7	80
<i>Ethnicity: Minority groups**</i>	19.9	6	6	9.8	9.4

*Note: The proportion of male- and female-owned SMEs do not add up to 100% because 1) for the SME population by region statistic, 21% of SMEs in the survey did not have majority-ownership gender disclosed or known, 2) for the LoCASE data, those unaccounted for either did not have majority-ownership gender disclosed or had equal ownership between them.

**Note: The proportion of majority-ownership by ethnicity does not add up to 100% to account for those SMEs where that information is not disclosed or known.

Targeted supports following Brexit

Following the UK's exit from the European Union and the closure of European Regional Development Fund (ERDF) programs, SME decarbonization support has shifted towards sectoral and regional schema, and incentive programs rather than mandatory compliance.

The Energy Efficiency Scheme for voluntary, community and social enterprise (VCSE) include fully funded audits and grants for efficiency measures to address organizational capital limitations. In parallel, a sector-specific pilot aims to ameliorate the hospitality sectors' high exposure to energy price volatility, through tailored carbon reduction plans and one-to-one coaching for hotels, restaurants and pubs. These moves signal understanding of the need towards differentiated, sector-aware decarbonization support.

Regional supports are also emerging, recognizing how geographical, political, and cultural contexts shape decarbonization adoption. For instance, the **Business Energy Advice Service (BEAS)** pilot in the West Midlands, combined free energy audits with match-funded capital grants and supported over 2,000 SMEs to implement efficiency measures with context-specific support. This approach identified barriers with capital limitations and limited in-house expertise for SMEs.

Further, incentive programs are gaining popularity following global rollback on ESG requirements. In lieu, procurement is being used to influence SME decarbonization. The National Health Service (NHS) and the British Broadcast Corporation (BBC) require all contract bids to submit carbon action plans, which has supported decarbonization adoption throughout healthcare and media sector supply chains.

Decarbonization by enterprise size

It has been established that capital, skills, and capacity are pre-eminent deterrents to participation in emissions reporting and the adoption of decarbonization technologies and interventions. The adoption of decarbonization technologies is known to scale with organizational size, as the capital, skills and capacity to use specialized tools increase. Larger organizations are also the target of most net-zero policies, emissions reporting standards, and frameworks.^{93, 94} When surveyed, enterprises of all sizes understand both the direct internal benefits (e.g., cost savings, staff recruitment or retention, efficiency gains) and external requirements (e.g., regulatory compliance, attracting or retaining financing and customers), but vary in adoption according to their capacities.⁹⁵ The following section provides a more granular assessment of the adoption of emissions reduction, cleantech and decarbonization technologies by enterprise size in Canada and the UK.

Enterprise size trends in Canadian majority-owned diverse small and medium-sized enterprises

As shown in Table 4, according to the available data in Canada, larger organizations tend to lead in implementing decarbonization solutions, with the adoption of cleantech operations or products generally increasing commensurate with the number of employees increasing.

Table 4. Adoption Rate of Clean Tech by SME size, with standard errors of estimates, from Statistics Canada’s Survey on Financing and Growth of Small and Medium Enterprises, 2023.⁹⁶

Enterprise Size	Businesses adopting cleantech (%)	Standard error (SE)
All SMEs	7.6	0.4
1 to 4 employees	5.1	0.5
5 to 19 employees	9.7	0.8
20 to 99 employees	13.4	1.4
100 to 499 employees	23.7	3.9

Small enterprises with 1-4 employees are less likely to adopt cleantech (5.1% of enterprises) compared to medium-sized enterprises (23.7%). Not only is there a need to support diverse SMEs in building their teams, attract funds for growth, and become cash flow-positive, but skills training is requisite to allow SMEs to understand technologies and support their implementation.⁹⁷

Enterprise size trends in UK majority-owned diverse SMEs

In the UK, metrics are not as expressly on clean tech adoption but include a broader range of decarbonization practices (e.g., having a net zero target, measuring carbon footprint, taking at least one sustainability action, having been asked for carbon data, or perceiving benefits to net zero). For UK SMEs, decarbonization adoption similarly scales with enterprise size as expected.

Data collected by the British Business Bank (see Table 5), between 2023 and 2024, shows behavioural changes face varied adoption by enterprise size,⁹⁸ as larger enterprises may assume greater capacity yet also be challenged with the emergence of silos or differing attitudes across a larger workforce.

Table 5. Adoption rate of decarbonization actions by business size, for which an enterprise has plans or already utilises, implements, or undertakes certain actions in the UK, between 2023 to 2024

Actions	Sole proprietors & micro enterprise (%)		Small-size enterprise (%)		Medium-size enterprise (%)		Large-size enterprise (%)	
	2023	2024	2023	2024	2023	2024	2023	2024
Behavioural changes for energy efficiency	73	69	73	76	82	86	88	85
Energy efficient technologies	49	53	50	54	67	71	86	91
Building improvements for efficiency	26	29	29	40	49	56	63	71

However, this may not represent the current progress where global commitments to ESG and decarbonization have stagnated, following geopolitical tension, trade negotiations, and backsliding on environmental regulations in lieu of short-term economic destabilization. For instance, when the new government took power in July 2024, emissions trajectories required only 24–32% cuts for the UK to realize climate targets⁹⁹ by 2025, that number has since increased to 32–38%. The most current rates of decarbonization commitment or enterprise action from a 2025 survey are presented in Table 6.

Table 6. Adoption rate of decarbonization commitment or enterprise actions, by SME size, in the UK, in 2025¹⁰⁰

Decarbonization progress indicators	All SMEs (% of enterprises)	Sole proprietors (%)	1-9 employees (% of enterprises)	10-49 employees (% of enterprises)	50-249 employees (% of enterprises)
Have a net zero target	11.0	6.0	11.0	15.0	29.0
Measure full or partial footprint	20.0	10.0	22.0	30.0	51.0
Taking at least one action for net zero	77.0	73.0	78.0	86.0	90.0
Have been asked for carbon data	9.0	3.0	10.0	20.0	37.0
Perceive >= one benefit of net zero	63.0	57.0	63.0	77.0	85.0
Engaged >= one stakeholder group	50.0	28.0	55.0	70.0	83.0

Regional variations in decarbonization

Canada and the UK are significantly different in the structure of government and regulatory responsibility for policies and programs related to net zero as well as the distribution of industries. For example, in Canada, while energy companies are often headquartered in large urban centers, their operations are often based in other regions. The Federal system of government means that resource intensive provinces such as Alberta have considerable control over the ways in which legislation is applied to the majority of oil producing companies in the country. In the UK, while there are urban and rural differences as well as distinctions between England, Scotland, Wales and Northern Ireland, there appears to be more commitment to meeting or exceeding national carbon targets with specific powers devolved over sectors such as planning, transport, and agriculture. Achieving net zero requires all regions both participate and benefit from decarbonization but rural economies are often neglected from net zero policies.¹⁰¹ While rural environments may have some operational advantages in many decarbonization initiatives, including space for producing and utilizing renewable energy, low population density, and the lack of existing infrastructure complexity¹⁰² they also may face added barriers because of distances, remoteness and the disproportionate impact of climate change. The definition of rural varies across Canada and the UK and is important to consider across facets of scale, proximity, and context.

Regional trends in Canadian small and medium-sized enterprises

In Canada, rural and remote regions accounted for about 52% of emissions in 2022.¹⁰³ The high contribution to emissions can be attributed to oil, gas, coal, mining, as well as other primary resource sectors in rural environments.¹⁰⁴ The number of rural SMEs has steadily declined between 2011, from

(21.0% of enterprises) to 2020 (18.1%)¹⁰⁵ While general data across the rural and urban divide is available, Canadian data does not further separate out rural and urban adoption by enterprise size.

Urban Canadian SMEs lead in net-zero commitments, with about 14.9% having made, or considering commitments, ahead of rural SMEs (11.3%). Rural SMEs are more likely to adopt consumer-grade clean technologies, with lower adoption of advanced, energy-efficiencies (27.0% of rural enterprises) compared to their urban counterparts (35.0%). Rural Canadian SMEs also tend to be less diverse. They are more likely than urban SMEs to be equally owned by men and women, and less likely to be majority-women owned,¹⁰⁶ trending towards majority male ownership. Rural SMEs were also less likely to be majority owned by visible minorities or person(s) with a disability, and more likely to be majority owned by Indigenous person(s). Likewise, the primary decision makers of rural SMEs (91%) were more likely to be Canadian born than the primary decision makers of urban SMEs (67%).

The spatial distribution of programs in Canada supporting decarbonization highlights different regional foci in supporting provincial, territorial, as well as national decarbonization goals. Rather, a general focus is on cross-cutting emissions reductions (52.4% of programs), building and industrial processes emissions (10.7%), and transportation emissions (6.7%).¹⁰⁷

In our review of existing national, provincial and territorial decarbonization programs, we found a series of forty-three policies and or programs with direct support to decarbonization (See Appendix A). In general, support for SMEs differed from the kinds of support for enterprises of any size. Almost all SME programs and policies support auditing and technical assessment, addressing many of the above-mentioned skills and capital gaps across the levels of decarbonization interventions (input and output reduction, policies and procedures, advanced policies and capital-intensive mechanisms) (e.g., Saskatchewan Power Commercial Optimization program, Manitoba Chamber Green Advantage program). In general, funding for SMEs was scoped towards low capital expenditures (LED lighting, smart thermostats, basic HVAC upgrades) (e.g., Canada's Clean Economy Tax Credit). SME-specific programs were more likely to fund skills training opportunities for employees than non-SME specific programs; however, support was limited. Programs often include tax credits and preferential financing for large-scale renewable deployment, industrial vehicle retrofits, and carbon sequestration.

Regionally, there were differences in program offerings. National programs tended towards tax credits, financial subsidies for large-scale integration of clean fuel and/or technologies. In Atlantic Canada (including New Brunswick, Newfoundland, Nova Scotia and Prince Edward Island), a concerted effort is seen in energy efficiency programs and low-cost consumer changes for input reduction (e.g., LED technologies, energy-smart appliances). Comparatively, Ontario focused on larger capital expenditures, such as reducing electrical load through substantial building retrofits, thresholding, materiality and energy management solutions. In Western Canada (Alberta, Saskatchewan, Manitoba, and British Columbia), enterprise support for decarbonization included financing for fuel switching and renewable energy production and purchasing, with some auditing and financial support for enterprise owners. In the North, policy priorities included financial incentives as well as skills training interventions. In the North, the unique geographical context of infrastructure development requires large capital, and many of these programs for energy sovereignty and decarbonization thoroughly incentivized substantial

investments for energy reduction (e.g., biomass recycling, solar, wind, and community-integrated renewable energy systems setup and use).

About 26% of programs included targeted or additional support for diverse majority-owners. Supports for diverse SMEs include subsidized capital expenditure for energy generation systems (e.g., solar, wind, bioheat), cost-sharing, non-refundable financial support mechanisms, tax credits, and subsidies.¹⁰⁸ However, programs focus on small or consumer-scale efficiencies (LED technologies, smart thermostats, energy-efficient appliances);^{109,110} they do not support larger (and more impactful) reductions like building energy retrofits, biomass boilers and district heating, renewable energy for space or water heating, fuel switching to lower carbon fuels, waste-to-energy, and methane capture.¹¹¹

Some skills support mechanisms exist, including the Clean Energy for Rural and Remote Communities (CERRC) which includes skills training, energy system management systems, and training to procure and leverage additional funding opportunities for decarbonization. Some programs also offered more targeted advisory support and knowledge building for technical assessment, business advisory services, auditing and emissions accounting. The PEI Climate Challenge Fund supported both consumer-level and industrial-scale greenhouse gas emission reduction through technology procurement (carbon sequestration, removal and storage), and the IESO Retrofit Program provides capital support for procuring larger energy-efficient assets (e.g. chillers, HVAC upgrades). However, widespread support or concerted targets for SMEs and equity-deserving groups among SMEs is limited.

Regional trends in UK SMEs

In the UK, rural and intermediate census areas are responsible for about 60% of the UK's emissions,¹¹² driven by agricultural (about 12.0%), transportation (28.0%) and residential and commercial heating activities.¹¹³ This contrasts with the predominance of emissions led by natural resource and extractive sectors in Canada, and thus requires a different landscape of skills interventions for enterprises to realize decarbonization. While available Canadian data disaggregates adoption of decarbonization interventions by both majority-ownership and rural-urban characteristics, data are scarce for the UK.

UK rural SMEs are more aligned with pro-environmental issues than urban SMEs (45% compared to 37%). Rural enterprises also seek differential participation in emissions reductions strategies relative to urban firms. While general data (see Table 10) across the rural and urban divide is available, UK data does not separate out by enterprise size.

Table 10: Decarbonization strategies employed by enterprises, separated out as rural or urban enterprises, within the UK, 2021.¹¹⁴

Decarbonization strategy	Adoption by rural enterprise (%)	Adoption by urban enterprise (%)
Reduce emissions	59.0	56.0
Environmental Training for staff	39.0	35.0
Monitor air pollution	39.0	25.0
Switch to renewables	38.0	40.0
Low-carbon products use	37.0	35.0
Reporting/ compliance	30.0	30.0
Carbon market research	26.0	20.0
Research and development	26.0	18.0

In 2021, UK rural SMEs were more likely to prioritise reducing their environmental impact (60.0% of enterprises) relative to urban contingents (57.0%), though less likely to introduce new technologies (49.0% vs 52.0%). Rather, rural SMEs employ less technical consumer-grade sustainable products or services (55.0% vs 53.0% of urban firms). Urban firms were more likely to focus on introducing digital technology, revealing an inherent skills gap for rural enterprises as they are ill prepared to engage in more technical interventions for further cost efficiencies and emissions reductions.¹¹⁵ Rural enterprises in the UK are also more likely to be SMEs, **See Table 11**. UK context-defined rural firms are also considerably more likely to say that the steps they took to reduce emissions, with 78% saying they reduced emissions significantly (by more than ten per cent) compared to 65% of urban firms.¹¹⁶ Some SME support programs, such as the European Regional Development Fund (ERDF), seem to show support for SMEs in urban and rural areas is reflective of the makeup of the overall SME population.

Table 11: Regional representation in multi-year grants for Southeast England SMEs by the European Regional Development Fund, 2023.^{117, 118}

SME location	SMEs by region (%)		SMEs applied / showed interest in LoCASE (%) (N=14,295)	SMEs applied / received LoCASE grants (%) (N=723)	SMEs receiving LoCASE grants for decarbonization (%) (N=630) (%)
	UK (%)	England (%)			
Urban	68	70	71.1	69.7	70.3
Rural	32	30	24.6	29.8	29.2

While proportional support can be interpreted as a positive, the lack of parity among LoCASE grant receivership may indicate that while rural areas lead in low-cost integrations of sustainability, they may lag in technological and purchasing requirements to reach decarbonization goals. In part, this may be due to the nature of rural firms that tend to disproportionately occupy natural resource intensive sectors, relative to urban environments, and thus face a greater incentive and regulatory burden for compliance towards net-zero.¹¹⁹ However, growing efforts for compliance are straining rural enterprises, who have articulated a disproportionate burden to find and maintain skilled labour in their enterprises and reduced capital.¹²⁰ Some UK policies have begun to address disproportionate capital,

including the Net Zero Growth Plan which seeks to subsidize enterprises and households operating off the gas grid, mostly in context-defined rural areas, through retrofitting energy efficiency measures.¹²¹

UK decarbonization has long been characterized by unevenness and institutional flux. Even during the period of European Regional Development Fund (ERDF) support, there was little geographical consistency. In England, Local Enterprise Partnerships (LEPs) directed substantial resources towards energy efficiency schemes, audits, and match-funded grants. Wales prioritized SME productivity and cleantech innovation within its European funding allocations, with no dedicated ERDF-backed energy efficiency programme for SMEs. This divergence reflects differing regional economic strategies rather than a coherent UK-wide framework for SME decarbonization.

Institutional stability has also varied across the four nations. Scotland and Northern Ireland maintain more consistent policy regimes, embedding SME support within longer-term energy and economic strategies. Scotland, for example, has offered zero-interest loans for energy efficiency and renewable investments for over a decade, signalling continuity in policy direction. Northern Ireland's approach, while shaped by political constraints, has similarly emphasized structured energy strategies and skills development. England, by contrast, has experienced repeated governance changes, including the creation of LEPs, their subsequent reconfiguration, and the recent absorption of responsibilities into local authorities. This churn has contributed to fragmentation and short programme cycles, limiting institutional memory and continuity.¹²²

Since the end of ERDF and the UK's exit from the EU, there has been a modest shift in policy instruments. While grant-funded audits and capital subsidies remain, newer approaches increasingly emphasise sector-specific support, peer-to-peer learning, and ecosystem development. Place-based networks and cohort models — bringing SMEs together to develop transition plans collectively — have become more prominent. Financial instruments have also diversified. The Development Bank of Wales offers targeted loans to support decarbonization, while Scotland's zero-interest loan schemes continue to prioritise repayable finance over direct subsidy. These trends indicate a gradual move away from purely grant-based models towards leveraging public funds to catalyse private investment and strengthen SMEs' capacity to make the business case for low-carbon measures.¹²³

Overall, the UK landscape remains fragmented across regions and nations, but recent developments suggest a cautious evolution towards more coordinated, capacity-building and financially sustainable approaches to SME decarbonization.

Data gaps and opportunities

Our research shows how significant structural issues - including overall economic factors, policies, and programs, as well as sectoral, size and regional differences - impact decarbonization. This makes it difficult to understand the impact of gender, ethnicity and race or Indigeneity on SME behaviours. This challenge is compounded by gaps and inconsistencies in the data available, limiting the ability to compare across contexts. We also recognize that the policy and geopolitical environment is undergoing significant change, limiting our ability to generalise.

At the same time, we observed a number of patterns which may offer opportunities to learn from one another in developing effective governance frameworks, strategies, policies and practices to advance our net zero ambitions. The fact that the regulatory environment, reporting and enforcement are rapidly evolving ¹²⁴ underscores the need to understand the multi-layered factors shaping organizational behaviour. Consistent with theories of institutional behaviour and ecological models of change, we need to understand the role of broad societal, cultural, socio economic and policy forces but also the role of industry standards, peer pressure, consumer and investor demands and individual values, knowledge and leadership. Our study identifies a number of data needs to better develop and implement evidence-based strategies for change. These not only include the need for consistent quantitative evidence on SMEs' emissions, energy use, and adoption of low-carbon solutions; but also in-depth qualitative data to generate insights into the barriers, motivations and opportunities relating to decarbonization.

First, the existing data showed key differences across sectors with the UK SMEs leading in adoption of decarbonization over Canadian SMEs in all sector categories. This may be attributed to a more structured regulatory landscape and sector-specific support available to SMEs.

Second, Canadian SMEs involved in production, construction and resource sectors have greater decarbonization adoption, where service sectors under participate relative to averages. Inversely, UK SMEs in the service sectors lead in reduction, with lower rates observed in construction, transportation, and resource extraction sectors. This may be a result of the sectors each country has prioritized and the supports in place.

Third, while there is some evidence that businesses owned by women, racialized or ethnically diverse people, and Indigenous peoples have different sustainability behaviours, this is somewhat complicated by structural issues regarding sector, size and location. More and better disaggregated data are needed both on reported behaviours as well as access to supports including programs designed to advance green transition.

Fourth, the context continues to evolve with emerging technologies holding promise to reduce greenhouse gas emissions.¹²⁵ However, data literacy and technology skills gaps remain, limiting SMEs' adoption of technological solutions.¹²⁶ Rather than focusing on green technology use, understanding its applicability as well as the enablers and barriers to adoption is critical.

Fifth, the study confirmed that in both countries, larger organizations lead in adoption of decarbonization solutions in part because they are the targets of regulation, policies, programs and decarbonization interventions.¹²⁷

Sixth, we found that context-defined rural firms outperform urban firms in the use of behavioural through to capital intensive mechanisms.¹²⁸ In both Canada and the UK, there are differences the types of support offered to SMEs based on their location reflecting local priorities as well as sectoral and jurisdictional issues.

Conclusions and Implications

This knowledge synthesis highlights the complex and evolving intersection between SMEs, decarbonization, EDI, and governance across Canada and the UK. SMEs represent a significant share of economic activity and emissions but are underrepresented in targeted climate policy. Representation gaps are pronounced for diverse majority-ownership SMEs, which are rarely the target of current decarbonization policies and initiatives, and a lack of available data hinders capacity for framework development to support the diverse realities of SME ownership, capacity, and day-to-day operations.

This study examined how decarbonization adoption differs across majority-ownership characteristics, sectors, enterprise sizes, and regional contexts. We used a variety of secondary data, literature, and policy analysis. Our findings reveal a fragmented and uneven landscape of decarbonization progress, where diverse SMEs, despite pro-environmental values, face limited capital, technical capacity, and business support services to participate beyond low-cost consumer-level efficiencies. These constraints reflect deeper structural inequities embedded within business ecosystems. There is a disconnect between the potential of diverse SMEs to contribute meaningfully to climate goals, and the support systems currently available to them.

At the same time, a one-size-fits-all approach applied to large enterprises is insufficient for SMEs. Variability across sectors, enterprise sizes, and rural-urban contexts necessitates complementing centralized support with tailored interventions. Good data are key to such interventions, yet this generally lacks for decarbonization programs and census data. Insufficient data hinders the ability of policymakers to understand the specific barriers faced by different groups, design targeted interventions, and effectively integrate EDI considerations in policy design through to implementation.

First, there is an overall need to apply a gender and multi-faceted diversity lens to emissions and decarbonization policies, governance, and practices. Here, it is important to recognize the role of historic assumptions and issues around incorporation, industry, enterprise size, and capacity in shaping businesses. Current observations on capital and skills levels amongst diverse SMEs are a manifestation of past and present barriers. Therefore, policymakers and researchers need to highlight the broader role of access to business ecosystems and support programs, which can facilitate the sharing of know-how or best practices on decarbonization to those SMEs with lesser exposure or capacity thus far.

Second, disaggregated data collection should be refined on emissions and decarbonization participation. Census data collection in Canada and the UK needs to be improved to better reflect SMEs' decarbonization realities, specifically metrics related to business size, majority-ownership characteristics, and workforce composition. The way data are collected, processed, and published should allow policymakers and researchers to link decarbonization participation data to specific diversity metrics to allow a better identification of current gaps in grants and business ecosystem access, for example. The difficulty in measuring 'access' through aggregated quantitative data also

necessitates complementary qualitative data collection to better distill on-the-ground realities. The highest levels of data integrity and transparency shall be upheld to enable input from various parties.

Third, policies should be geared toward addressing regional, sectoral, and majority-ownership barriers that shape SMEs' decarbonization pathways. For example, rural regions often host higher-emitting industries but face structural constraints such as weaker infrastructure, labour shortages, and limited access to capital for technological decarbonization interventions. SMEs in these contexts may therefore face disproportionate barriers to adopting more capital-intensive, technical solutions. Similarly, technical skills education in areas such as carbon accounting, emissions reporting, and green technologies should also be expanded, particularly to improve accessibility for equity-deserving SME owners seeking to integrate decarbonization into their businesses. Beyond regions and owner demographics, greater sectoral attention is also needed for industries with lower decarbonization adoption, such as service sectors in Canada or construction and resource sectors in the UK. Overall, policymakers should better assess whether existing gaps reflect regional disparities in support, sector-specific barriers, or uneven access among diverse business owners.

Fourth, the design of targeted SME support programs should prioritise co-creation, periodic evaluation, and iterative policy development. Engagement with multi-level governments and local partners (including SME associations, regional business networks, and community organizations) can help ensure that support programs reflect on-the-ground realities, knowledge, and capacity, while also creating a more coherent and navigable support-policy environment, such that those SMEs engaging with decarbonization for the first time can relate to relevant programs, technical expertise, and peer networks. Embedding structured evaluation mechanisms within grants and funding programs would further improve transparency and policy learning, especially in assessing which interventions most effectively advance SME decarbonization. Over the longer term, policy narratives should emphasize the long-term value of diverse SME decarbonization, ensuring progress is not susceptible to periodic policy backsliding.

These findings have implications for research, and we have identified a number of opportunities for further work:

- Longitudinal and comparative studies tracking SME decarbonization over time, particularly with disaggregated data on diverse majority-ownership, is needed for effective decarbonization policy interventions.
- Further analysis is needed on the effectiveness of current business support systems for diverse SMEs to realize and scale decarbonization (e.g. grants, tax incentives, technical training programs).
- Analysis of how AI and digitalization can ameliorate assist with emissions tracking, reporting, and identifying opportunities for operational efficiencies, especially for small and resource-constrained SMEs.
- Qualitative research on the lived experiences of diverse SME owners, including barriers related to trust, awareness, and access, would complement existing quantitative data to inform better policy design.
- Place-based research is needed to understand how local entrepreneurship and commerce ecosystems (e.g. regional innovation hubs, Indigenous governance, and rural economies) can

support tailored decarbonization pathways and help complement the more centralized SME support programs of the present.

- More research and knowledge mobilization to link decarbonization to business goals, value creation and risk mitigation to support market growth, business resilience, and longer-term efficiencies regardless of the regulatory requirements.

Achieving meaningful progress toward societal net-zero targets will depend on the extent to which diverse SMEs are fully integrated into climate strategies. Inclusive, context-sensitive, and data-informed governance approaches would help unlock the transformative potential of SMEs as drivers of sustainability and inclusive economic growth.

Appendix

Table A1: Regional (Provincial / Territorial) and National Decarbonization Programs in Canada, disaggregated by whether they have a focus or concerted support for Indigenous Peoples and equity-deserving groups as well as small- and medium-sized enterprises.

Program Name	Region	Decarbonization program description	Decarbonization Category	EDI focus?	SME focus?
Efficiency Manitoba	Manitoba	Capital funding for energy-efficient equipment installation	Energy Efficiency — Industrial & Equipment	No	No
Manitoba Climate and Economy Solutions Program	Manitoba	Fuel switching retrofits for stationary equipment; energy efficiency upgrades; industrial and commercial vehicle retrofits; renewable energy and clean fuel production	Fuel Switching; Energy Efficiency — Industrial & Equipment; Clean Transportation & Fleet; Renewable Energy Generation; Clean Fuel Production	No	No
Manitoba Green Advantage (MGA)	Manitoba	GHG assessment and strategic sustainability action planning; financial support for implementation of identified emissions-reduction projects	GHG Assessment & Strategic Planning	No	Yes
Manitoba Merit Based Program	Manitoba	Funding for greenhouse gas (GHG) emissions reduction initiatives	GHG Assessment & Strategic Planning	No	No
Atlantic Canada Investment Tax Credit	National	Rebates and subsidies for energy-efficient appliance installation	Energy Efficiency — Buildings & Facilities	No	No
Canada Infrastructure Bank: Buildings Retrofit	National	Financing for energy efficiency retrofits in existing buildings	Energy Efficiency — Buildings & Facilities	No	No
Clean Energy for Rural and Remote Communities (CERRC)	National	Capital and planning support for renewable energy deployment (solar, wind); bioheat projects; energy planning; capacity building and workforce training	Renewable Energy Generation; Clean Fuel Production; Capacity Building & Advisory Services; GHG Assessment & Strategic Planning	Yes, Indigenous groups	No
Clean Fuels Fund	National	Cost-shared, conditionally repayable funding to build, retrofit, or expand clean fuel production facilities	Clean Fuel Production	Yes, Indigenous groups	No
Clean Tech Investment Tax Credit (ITC)	National	Tax credits and subsidies for business investment in energy efficiency	Energy Efficiency — Buildings & Facilities; Energy Efficiency — Industrial & Equipment	No	No

Program Name	Region	Decarbonization program description	Decarbonization Category	EDI focus?	SME focus?
Climate Action Incentive Fund	National	Financial incentives to reduce GHG emissions through clean technology adoption, fuel switching, process improvements, and energy savings	Fuel Switching; Energy Efficiency — Industrial & Equipment; Clean Technology Innovation & Demonstration	No	Yes
Indigenous Leadership Fund	National	Funding for renewable energy deployment, energy storage systems, and grid modernization	Renewable Energy Generation; Energy Storage & Grid Modernization	Yes, Indigenous groups	Yes
National Research Council of Canada Industrial Research Assistance Program (NRC IRAP)	National	Financial and advisory support for cleantech innovation across energy, water, and waste; proof-of-concept through scale-up funding; referrals to clean innovation ecosystem partners; capacity building	Energy Efficiency — Buildings & Facilities; Energy Efficiency — Industrial & Equipment; Waste Reduction & Circular Economy; Clean Technology Innovation & Demonstration; Capacity Building & Advisory Services	No	Yes
Smart Renewables and Electrification Program	National	Funding for renewable energy deployment, energy storage systems, and grid modernization	Renewable Energy Generation; Energy Storage & Grid Modernization	Yes, Indigenous groups	No
Government of NB Environmental Trust Fund	NB	Funding for waste reduction and diversion initiatives	Waste Reduction & Circular Economy	No	No
NBIF Climate Impact Fund	NB	Non-dilutive, non-payable grants for clean technology innovation and process integration (SMEs with ≤500 employees)	Clean Technology Innovation & Demonstration	No	Yes
Save Energy NB Industrial Energy Efficiency Program	NB	Energy audit support; capital incentives for energy efficiency upgrades; employee training subsidies	GHG Assessment & Strategic Planning; Energy Efficiency — Industrial & Equipment; Capacity Building & Advisory Services	No	Yes
Newfoundland and Labrador green technology tax credit	ND	Subsidies supporting energy conservation, clean energy generation, and efficient fossil fuel use for SMEs	Energy Efficiency — Industrial & Equipment; Renewable Energy Generation; Fuel Switching	No	No
TakeCHARGE Custom Energy Solutions	ND	Technical water-use efficiency audit and capital procurement support for operational improvements	GHG Assessment & Strategic Planning; Energy Efficiency — Industrial & Equipment	No	Yes
Efficiency Nova Scotia Small Business Energy Solutions	Nova Scotia	Capital grants for energy efficiency upgrades with interest-free financing on utility bills	Energy Efficiency — Buildings & Facilities; Energy Efficiency — Industrial & Equipment	No	Yes

Program Name	Region	Decarbonization program description	Decarbonization Category	EDI focus?	SME focus?
HCi3 Nova Scotia	Nova Scotia	Accelerator program and funding for decarbonization investment; consumer-level behaviour change support	Clean Technology Innovation & Demonstration; Behaviour Change & Awareness	No	No
Low Carbon Communities Nova Scotia	Nova Scotia	Capital support for clean energy and low-carbon solutions in buildings, electricity generation, and transportation	Energy Efficiency — Buildings & Facilities; Renewable Energy Generation; Clean Transportation & Fleet	No	No
NS Custom Energy Retrofits	Nova Scotia	Capital grants and rebates for energy efficiency retrofits and technology integration	Energy Efficiency — Buildings & Facilities; Energy Efficiency — Industrial & Equipment	No	No
Pay for Performance (P4P)	Nova Scotia	Energy audit support and capital incentives for energy intensity reduction and cost savings	GHG Assessment & Strategic Planning; Energy Efficiency — Industrial & Equipment	No	No
REMIROCaN (Building Integrated Renewable Energy) - CINUK:	Nunavut	Energy audit support and capital incentives for energy intensity reduction and cost savings	GHG Assessment & Strategic Planning; Energy Efficiency — Industrial & Equipment	Yes, Indigenous groups	No
Arctic Energy Alliance (AEA) Funding	NWT	Rebates and funding for renewable energy installations (solar, wind, wood pellet heating, biofuels, synthetic gas, ground-source heat pumps)	Renewable Energy Generation; Fuel Switching	Yes, Indigenous groups	No
GHG Grant Program for Buildings and Industry	NWT	Capital for building energy retrofits, biomass boilers, fuel switching, waste-to-energy, methane capture, EV charging infrastructure, and mobile equipment retrofits	Energy Efficiency — Buildings & Facilities; Renewable Energy Generation; Fuel Switching; Waste Reduction & Circular Economy; Clean Transportation & Fleet	Yes, Indigenous groups	Yes
Green Economy Canada - Program for Manufacturing	Ontario	Technical studies on GHG reduction opportunities, emissions measurement, and operational process changes	GHG Assessment & Strategic Planning; Energy Efficiency — Industrial & Equipment	No	Yes
IESO - Open Expanded Energy Management Program	Ontario	Funding to strengthen facility energy management systems and implement efficiency upgrades	Energy Efficiency — Buildings & Facilities; GHG Assessment & Strategic Planning	No	No
IESO - Retrofit Program	Ontario	Capital for purchase of large energy-efficient assets (e.g., chillers, HVAC systems)	Energy Efficiency — Buildings & Facilities	Yes, rural/remote	No
Save ON Energy - First Nations Community Retrofit Program	Ontario	Energy audit support and capital incentives for energy intensity reduction and cost savings	GHG Assessment & Strategic Planning; Energy Efficiency — Industrial & Equipment	Yes, Indigenous groups	No

Program Name	Region	Decarbonization program description	Decarbonization Category	EDI focus?	SME focus?
				groups	
Save On Energy - Remote First Nations Program	Ontario	Rebates for low-cost energy efficiency measures (LED lighting, lighting controls, smart thermostats)	Energy Efficiency — Buildings & Facilities	Yes, Indigenous groups	No
Save on Energy - SME program	Ontario	Rebates for purchase of energy-efficient capital assets (e.g., LED lighting, efficient fixtures)	Energy Efficiency — Buildings & Facilities	No	Yes
Community Energy Solutions	PEI	Capital funding and energy audit support for SMEs and community organizations undertaking decarbonization projects	GHG Assessment & Strategic Planning; Energy Efficiency — Buildings & Facilities; Energy Efficiency — Industrial & Equipment	No	Yes
EfficiencyPEI	PEI	Energy audit, personalized recommendations, and capital funding for consumer-level energy efficiency improvements	GHG Assessment & Strategic Planning; Energy Efficiency — Buildings & Facilities	No	No
PEI EV Charger Program	PEI	Capital funding for fleet decarbonization and zero-emission vehicle adoption	Clean Transportation & Fleet	No	No
PEI Business Energy Rebate	PEI	Capital funding for energy-efficient equipment installation	Energy Efficiency — Industrial & Equipment	No	No
PEI Climate Challenge Fund	PEI	Broad community climate funding: GHG reduction, carbon sequestration, climate adaptation and resilience, research, public education, and equitable climate solutions	Climate Adaptation & Resilience; Carbon Sequestration & Nature-Based Solutions; GHG Assessment & Strategic Planning; Capacity Building & Advisory Services; Clean Technology Innovation & Demonstration; Behaviour Change & Awareness	Yes, equity-deserving group focus	Yes
Solar Electric Rebate Program	PEI	Capital funding for solar energy generation	Renewable Energy Generation	No	No
Saskatchewan Technology Fund	SK	Funding for industry-driven technology projects that mitigate, sequester, or capture GHG emissions	Clean Technology Innovation & Demonstration; Carbon Sequestration & Nature-Based Solutions	No	No
SaskPower Commercial Energy Optimization Program	SK	Advisory services to identify energy-saving opportunities, guide project development, and connect to financing options	GHG Assessment & Strategic Planning; Capacity Building & Advisory Services	No	Yes
Yukon Good Energy Rebates	Yukon	Financial support for building retrofits, clean transportation vehicles, and renewable energy generation	Energy Efficiency — Buildings & Facilities; Clean Transportation & Fleet; Renewable Energy Generation	No	No
Yukon Energy: efficiency	Yukon	Capital for energy efficiency purchases and upgrades	Energy Efficiency — Buildings & Facilities;	No	No

Program Name	Region	Decarbonization program description	Decarbonization Category	EDI focus?	SME focus?
upgrades for ICI buildings			Energy Efficiency — Industrial & Equipment		

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