

Beyond industrial energy efficiency: defining the multiple roles that businesses can play for climate positive action

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Abstract

In the last three decades, significant research and policy attention across OECD countries has focused on how to encourage greater energy and resource efficiency in industry. This has been justified on the basis of cost, energy and emissions savings, and productivity improvements that can accrue to both large enterprises and SMEs. However, with the increasing urgency of climate change and in response to the energy crisis which has affected millions of businesses, there is a need to look beyond efficiency and consider the multiple roles that businesses can (and must) play in accelerating the transition towards net-zero. In focusing on efficiency, researchers and policymakers have tended to frame industrial organisations primarily as (1) *consumers* of energy and resources, with interventions to reduce these whilst maintaining output (productivity). There has also been a focus on ‘eco-innovation’ policies that address a second role that businesses play in energy transitions, as (2) *enablers* of low-carbon consumption (e.g. developing green products and services). Using findings from a two-year research study on the governance of SMEs and climate change, including 76 interviews with industry stakeholders, expert workshops, and a narrative literature review, we discuss the effectiveness of these dominant role-framings, and highlight three *additional* roles that warrant attention and analysis: businesses as (3) *adopters* of critical low-carbon technologies and services including demand-side flexibility; (4) *citizens* with the power to influence policy agendas and contribute towards local placemak-

ing efforts; and (5) *social influencers*, creating and embedding social norms around consumption choices and environmental responsibilities. This paper seeks to widen the discourse of industrial decarbonisation, challenging researchers and policy-makers to reconsider their assumptions about the role of business in the energy system, and to forge new approaches which capitalise on their potential for climate-positive action.

Introduction

There is growing interest amongst the business community, as well as scholars of organisations and entrepreneurship, in the question of what businesses can do to be more proactive on climate action. Responding to growing academic and policy attention on the need for businesses to contribute towards climate action, this paper outlines the ways in which they can do so. Most discussion of business and climate change has so far focused on two of these roles: as “consumers”, and the direct emissions arising from their consumption of energy and other resources (IEA, 2015); and as “enablers” of low-carbon consumption (developing green products and services) (Koirala 2019). We draw on an extensive review of interdisciplinary literature and a large empirical study on the governance of climate mitigation for small and medium-sized enterprises (SMEs) in the UK, to identify three additional roles: *adopters* of critical low-carbon technologies and services including demand-side flexibility; (4) *citizens* with the power to influence policy agendas and contribute towards local placemaking efforts; and (5) *social influencers*, creating and embedding social norms around consumption choices and environmental responsibilities (Figure 1). Whilst there are large variations in

the types and scales of activities within the roles we outline, our evidence suggests that every business can participate in climate action within their own sectoral and local context.

In recent years, as environmental sustainability has risen up the agenda for many businesses, there has also been increased scrutiny of so-called ‘Greenwashing’ (Stecker 2016), alongside calls for increased business transparency (Jacobs and Finney 2019), and the need to ‘walk the talk’ (Walker and Wan 2012). However, in response to high levels of public scrutiny, there is an increasing danger of ‘green-hushing’ (Acuti et al., 2022), as businesses fear communicating their efforts to address climate change, and even step back from sustainability initiatives. This article therefore aims to contribute towards a constructive and positive discourse on business sustainability. Rather than focusing on their adverse impacts, we highlight the various ways businesses can and do contribute positively to climate change mitigation. Further inspiration for this article is derived from recent discussion in environmental psychology on the multiple roles that individuals play in climate action which have attracted significant attention beyond academic circles (Nielsen et al., 2021; Hampton and Whitmarsh 2023).

This paper provides a narrative review of a wide range of academic literature. Given the breadth of its aims, a comprehensive account of empirical and theoretical research on the organisations and climate change is not possible. As such, we draw preferentially on systematic review articles, and more recent contributions where available. The article also draws briefly on primary evidence from an ongoing research project investigating the governance of SME decarbonisation in the UK (UKERC, n.d.). The project team have completed over 75 interviews and held three workshops with policymakers, business leaders and representative organisations, exploring how businesses can be supported to take action on climate. The roles we elucidate in this paper have emerged from project findings which reveal the diverse ways in which businesses *already* contribute positively towards meeting climate goals. The paper is structured according to the five roles identified, with sub-headings used to

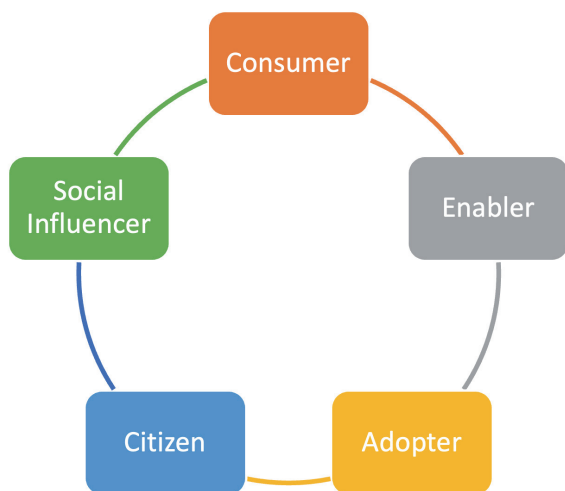


Figure 1. The five roles businesses can take for climate change action.

identify related capacities and functions. We conclude by outlining limitations and potential avenues for using and developing this classification.

Consumer

The most direct way in which businesses contribute to climate change is through their role as consumers of energy and resources, with associated greenhouse gas (GHG) emissions. Environmental impacts are roughly proportional to the size of business, and thus larger corporations attract most policy attention, however the collective emissions of small- and medium-sized enterprises amounts to roughly half of emissions from the business sector (OECD, 2021). The literature focuses on three main ways in which businesses as consumers can contribute to climate action: understanding their own impacts; taking action to increase efficiency; and sourcing sustainable materials and inputs.

ENERGY AUDITS AND CARBON FOOTPRINTS

Conducting energy audits and calculating carbon footprints are crucial for raising awareness about energy use, environmental impacts, and mitigation opportunities (Abdelaziz et al., 2011; Blundel and Hampton 2021). They indirectly help reduce energy usage through enabling consumption reviews, savings calculations, and recommended improvements (Energy Savings Trust 2021). A plethora of online tools and calculators are available to help businesses calculate their impacts, communicate results to stakeholders and to begin to prioritise action, including supply chain management, sustainability reports, education, networking and even product life cycle analyses (SME Climate Hub, n.d.). However, the literature highlights that implementation of sustainable management tools is varied and oftentimes lacking, particularly amongst SMEs, often due to lack of spare funds and time resources (Johnson and Schaltegger 2016).

EFFICIENCY

Efficient use of energy and other resources is widely recognised to be the first priority for businesses seeking to reduce their environmental impacts, as these actions can also deliver cost-savings and productivity improvements. Typical methods of energy efficiency measures outlined for buildings include building fabric and insulation; using LED lighting; installing double glazing; draft proofing; as well as other energy management methods (Belussi et al., 2019; Abdelaziz et al., 2011). Investing in more energy efficient appliances is also effective (IEA 2023), as well as behavioural measures such as switching off lights and closing windows and doors to conserve energy (Hee et al., 2015; Tzempelikos 2010). An analysis of 280 business energy audits across Europe found that, of all recommended energy saving actions, 37 % involve zero-capital investment (Fresner et al., 2017). As well as optimising building energy management, there is a body of literature identifying opportunities for process energy efficiency, focused largely on the manufacturing sector (Solnørdal and Foss, 2018).

SUSTAINABLE SOURCING

Besides conserving energy, the economics of on-site renewable energy generation are improving (IEA, 2024), and in recent years many larger businesses have secured direct power-pur-

chasing agreements to guarantee clean electricity supply (Mittler et al., 2023). Electrification of heating and transport is an important and necessary step for businesses to reduce their reliance on fossil fuels. Heat pump technology is developing rapidly and is being deployed not only for space heating and hot water, but in many industries such as brewing (IEA, 2022; Flórez-Orrego et al., 2023). Electrification can also be implemented in other industrial processes, such as materials production, electro-thermal heating or electrowinning in the steel industry (Lechtenböhrer 2016).

Businesses operating in supply chains can decrease their impact as consumers by sourcing and utilising more sustainable resources. This includes the procurement of materials for processing, from raw mineral extraction through to manufacturing, distribution, and retailing. Auditing supply chains can have co-benefits of increasing awareness, visibility and transparency for businesses also (Kumar et al., 2023). Businesses can also reduce overall material consumption by adopting sustainable circular economy practices (Hailemariam and Erdiaw-Kwasie 2023).

Enabler

Businesses are the principal actors for developing, innovating and diffusing the environmental goods and services which underpin sustainability transitions. We outline three broad arms of this role; first as providers, second through eco-innovation; and third via business models.

PROVIDERS

A small body of social scientific literature is dedicated to identifying the crucial role played by businesses as intermediaries or ‘middle actors’, between the ‘top down’ efforts of governance and policy actors, and the individual, household-level behaviours addressing climate change from the ‘bottom up’ (Parag and Janda 2014). With emphasis on the challenge of decarbonising buildings, this literature has emphasised the importance of professions such as architects, building trades, electricians and plumbing for operating, enabling and facilitating the adoption of low carbon technologies, from insulation to heat pumps and electric vehicle charging (Janda et al., 2014). There is increasing attention and concern for the lack of low-carbon and ‘green skills’ in these sectors, although this appears to be changing in pursuits of solutions, such as green-skills colleges and training schemes (Marsden et al., 2013). In London, UK, the congestion charge has helped to create conditions for cycle couriers to out-compete diesel vehicles for deliveries, and small businesses are driving this change, enabling consumers to mitigate the impacts of their online purchases (McLeod et al., 2020).

ECO-INNOVATION

Secondly, businesses and start-ups can progress climate innovation by creating new products and services that fill market gaps (Hakovirta et al., 2023a), which enables greater choice for consumers by introducing less impactful alternatives. While often synonymous with technology, eco-innovation includes low-tech solutions such as refill and reuse retail outlets which give consumers the opportunity to buy groceries without adding to plastic waste (Moss et al., 2022). Eco-innovation can

also relate to new organisational processes and practices that reduce emissions and other environmental impacts (Janda et al., 2014). The Low Carbon and Environmental Goods Sector (LCEGS) is growing in almost every market (kMatrix Data Services Ltd. 2021), reflecting a general trend of increased investment in energy technology research and development since 2002 (IEA, n.d.). While public sector R&D budgets have critical catalytic power, it is investment by private sector businesses which drives the development of key technologies such as perovskite solar photovoltaics (Suresh Kumar and Chandra Babu Naidu, 2021), vanadium flow-batteries (Gencten and Sahin, 2020). Moreover, businesses are the key actors for the diffusion of existing eco-innovations such as electric vehicles and heat pumps.

BUSINESS MODELS

Enabled by digital technologies, a significant economic restructuring is underway, as businesses shift from ownership-based models to service-based alternatives. By converting end-consumers from owners to renters of products or services, it is often possible to achieve significant reductions in energy use and associated emissions (Curtis and Mont, 2020). For example, Mobility as a Service (MaaS) platforms, such as car clubs and bike-sharing schemes enable the greater utilisation of assets, reducing embodied carbon, parking issues and congestion in cities (Kriswardhana and Esztegar 2023). Businesses can establish a flexible company strategy that is aligned with environmental action from the start, to build resilience for future economic, social and environmental changes (Hakovirta et al., 2023a).

Adopter

Our third role is businesses as adopters of critical low-carbon technologies and services. Distinct from the more transactional role of *consumer* in which goods and services are purchased as inputs, the adopter role centres on the incorporation of new low-carbon technologies and services which involve more fundamental change to the routines and norms of business practice.

LOW-CARBON TECHNOLOGIES

Although originally developed for theorising household adoption, domestication theory (1992) has been applied to help understand how businesses adopt low carbon innovations (Harwood 2011). Electric vehicles (EVs) are widely recognised as instrumental in shifting the transport sector to renewables. Adopting electric vehicles means changing business infrastructure significantly: changing vehicle fleets, adding charging ports, creating new depots, and adopting new route-optimisation processes (Schmidt et al., 2021). Similarly, as the return-on-investment for solar arrays coupled with lithium-ion batteries becomes more attractive, many smaller organisations are installing these technologies in buildings to protect themselves from volatile electricity prices (Hassan et al., 2023). Historically, policymakers have sought to accelerate the adoption of such technologies through subsidies and financial incentives. However, it is worth considering that alternative interventions may also yield positive outcomes. For instance, in France, a recent bill requires businesses with more than 80 parking spaces to collocate solar panels on-site (Jacquot 2022).

DIGITALISATION

Digitalisation underpins the adoption of low carbon technologies and practices (Wilson et al., 2020). There has been a global acceleration of digital grid technologies since the COVID pandemic (IEA 2023). Digital consumer innovation can increase efficiency and productivity for businesses (*ibid.*) including the adoption of telecommuting, time of use electricity pricing, smart building management and fleet management software (Gan et al., 2020). New business models are emerging from digitalisation, such as Energy as a Service schemes (Muthumala et al., 2022) and there is an increased need for digital markets to expand, given that global flexible assets need to increase ten times over by 2030 to meet net zero emissions targets (IEA 2023).

DEMAND SIDE FLEXIBILITY

Demand side flexibility (DSF) helps to manage electricity grids and is becoming increasingly important as fossil fuels are replaced by intermittent renewable energy sources (Heffron et al., 2020). The subject of substantial debate in the residential context, (Golmohamadi 2022), DSF is less controversial in industry, and can help to reduce energy costs for energy intensive industries and even smaller businesses able to shift their demand. Common DSF strategies include automated building management systems, installing battery storage, and energy efficiency (Cruz et al., 2018). The need for flexibility depends on the extent of grid constraints and therefore vary geographically, and the structure of electricity markets is highly variable, meaning that in some jurisdictions, some businesses are more exposed to wholesale price fluctuations than others, depending on their locations (Gleue et al., 2021). As businesses increasingly electrify their fleets, flexible charging exemplifies a practice that businesses can adopt to help minimise the use of fossil fuels for electricity generation (Ioakimidis et al., 2018). While the use of EV batteries for grid balancing or other business applications has attracted significant interest, the deployment of so-called V2X technologies remains nascent (Ravi and Aziz 2022). It is important to highlight that the adoption of DSF is largely applicable for the global north, whereas in much of the world, businesses face the simple challenge of securing reliable electricity supplies and internet access. Businesses deploying solar and micro-storage, as well as those digitalising key services such as healthcare, are helping to boost economic development even in the world's poorest areas (Kunkel and Tyfield 2021).

LOW CARBON NORMS

Meeting climate goals will require widespread behaviour change, which in turn requires changes to social and business norms. Businesses can have significant influence on changing the norms which underpin high-carbon behaviours such as the use of private vehicles for business travel and commuting. Here, businesses can encourage active modes of transport by staff by providing secure bicycle storage, showers, and reward schemes (Biernat et al., 2020). They can also disincentivise car usage by introducing parking levies and removing parking spaces (Becker and Carmi 2019); hourly car parking fees reduced car usage and GHG emissions by around 75 %, in a study based in the University of Coimbra in Portugal (Cruz et al., 2017). In Japan, where air conditioning represents a significant source of emissions, the government developed

a campaign called 'Cool Biz'. Taking a decision to raise the temperature at which air-conditioning was used to 28 °C, they also sought to change social norms around the concept of 'smartness', relaxing work dress codes to enable workers to be comfortable in warmer environments (Hampton and Adams 2018; EESI 2015).

Citizen

The notion of corporate responsibility (CR) has become a topic of mainstream discussion in business discourse as well as academia (Ng 2022; Assländer and Curbach 2014), and a substantial body of literature has sought to define and debate the concept of corporate citizenship (Moon et al., 2005; Tiba et al., 2019). These discourses have had substantial impact on corporate policy, and businesses now play a prominent role in international climate negotiations. The 2015 Paris Agreement, for instance, incorporates a clause defining businesses as 'duty-bearers' (OHCHR 2015, cited in Seck 2018). Firm size has particular relevance with regards corporate citizenship, and most CR discourse focuses on large corporates, including significant scrutiny on whether sustainability pledges and surrounding communications translate into action (de Freitas Netto et al., 2020). By contrast, whereas SMEs have lesser capacity to communicate their efforts, they are more able to 'walk the talk' as climate citizens (Wickert et al., 2016). We define the citizen role in four ways: moral responsibility, influencing policy agendas, contributing to local placemaking efforts, and caring for people and planet.

MORAL RESPONSIBILITY

Businesses can be morally responsible agents through compliance, transparency, and sustainable investment. Compliance with environmental regulations is the most basic activity that businesses can pursue as climate-positive citizens, despite obligations varying significantly in different countries and across industrial sectors (Dechezleprêtre and Sato, 2017). Transparency is achieved through disclosing company impact on the environment and demonstrates accountability (Stokes 2002). Investing sustainably also forms part of the citizen role. Buying carbon offsets to mitigate emissions is a prominent example which attracts widespread debate and critique (Watt, 2021). However, sustainable investment can also involve activities such as auto-enrolling employees into zero-carbon pensions, and adopting less aggressive investment-payback requirements for green projects.

POLITICAL ENGAGEMENT

Businesses can act as mediators and influence policy (Bernat et al. 2023). They can act directly, responding to consultations, giving evidence, and lobbying. But they also have important indirect political agency. As middle actors, heating engineers, plumbers and electricians have significant influence over public attitudes towards low carbon technologies (Owen et al., 2014), with implications for public support for climate leadership by politicians. Unfortunately, incumbents such as gas-heating engineers and car mechanics have an interest in downplaying the benefits of alternative technologies such as heat pumps and electric vehicles (Lamb et al., 2020). Such micro-politics can have large-scale ramifications. Recently, the UK government

reversed plans to fine boiler manufacturers if they failed to meet minimum quotas for installing heat pumps, in response to emerging evidence that such businesses intended to pass the cost of fines on to consumers (Wood, 2024).

While corporations and business representative organisations have conventionally sought to minimise the regulatory burden associated with climate action (Grasso, 2019), this may be beginning to change. In our research focusing on steel, horticulture and restaurants in the UK, interviews with sector bodies have revealed widespread acknowledgement of the need for more climate-related regulation. Business members are increasingly concerned about the threat of climate change and desire to be proactive in response: they are urging representatives to lobby governments to ensure that policies are designed over the long-term to enable investment certainty; and to create a level-playing field which reflects the different capabilities of businesses (Cooremans, 2011). This includes exempting smaller businesses where appropriate and providing incentives alongside obligations.

PLACEMAKERS

Many businesses are highly embedded in their local environments, relying on the community for custom, labour and inputs, and generating social capital. It is imperative that companies see themselves as part of public culture, rather than exogenous to themselves (Birch 2001). As placemakers, businesses can act within local social and economic networks to create climate solutions (Eadson et al., 2023). For instance, businesses in hospitality sectors which provide spaces for gathering can be crucial meeting spaces for climate discussion, and many have proactively sought to host and facilitate these exchanges (Baden and Prasad, 2016; Fine, 2022). In Oxford, UK, the City Council is seeking to leverage moral place-based affiliations of larger organisations, to encourage them to invest in carbon offsetting projects locally. This initiative, called 'Area Based Insetting', keeps investment local, accelerates place-based decarbonisation and provides associated health and social benefits (Frewin 2023).

CARE

The concept of care is rarely used in relation to businesses, and yet businesses are providers of livelihoods to employees and their families, and have a duty of care to their communities and local environment. Social enterprise is at the forefront of this movement, and there are an estimated 11m social enterprises worldwide, valuing social, environmental, and financial outcomes equally (British Council and Social Enterprise UK, 2022). Businesses fostering a culture of care may benefit from greater loyalty from both staff and customers. Many policies prioritising wellbeing have co-benefits including productivity, health, and emissions reduction (Gonçalves et al., 2023). Activities range from encouraging workers to spend time in nature, to subsidising bus routes, promoting active travel for commuting and work trips, and telecommuting. Salary sacrifice schemes can allow employees to purchase low-carbon behaviours before tax is deducted from their pay. Examples in the UK include the ability to buy bicycles and electric vehicles, and work is underway to explore the potential for home energy retrofit (CREDS 2023). When businesses take climate action, there is also potential for spillover effects to engender pro-en-

vironmental behaviour amongst employees at home (Verfueth et al. 2021), although there is a need for more research on when and how this effect can be maximised.

STEWARDSHIP

Businesses in primary sectors such as agriculture, forestry and mining play a crucial role as stewards of the natural environment. Businesses can steward directly through conservation practices and nature recovery, or indirectly through investment and making best efforts to run sustainably. Evidence suggests that businesses in primary sectors are becoming increasingly aware of these roles (Folke et al., 2019), but strong policy frameworks are required to incentivise nature recovery alongside conventional revenue streams.

Relatedly, businesses are pivotal actors for climate *adaptation* and climate justice. While the insurance industry plays a crucial role in helping individuals and businesses recover from the impacts of extreme weather, other businesses lay the foundations for climate resilience through the provision of essential goods. Businesses also provide the job opportunities for those displaced by climate change and those seeking new opportunities in the context of declining, fossil-fuel dependent industries (Cha 2017).

Influencer

Businesses are increasingly called to be 'sustainable development agents' (Mio et al., 2020: 1). Businesses are social and cultural actors, creating and embedding social norms around environmental pro-behaviour and environmental responsibilities. They influence downstream (publics), upstream (policy makers), sideways (other businesses), and internally (employees) (Figure 2). Upstream influence was discussed in the previous section, so the following section summarises other ways in which businesses can use their influence for climate.

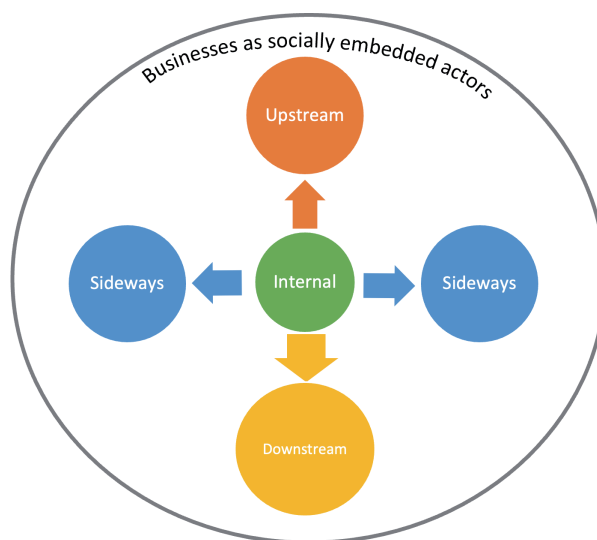


Figure 2. Visual representation of the multidirectional influence of businesses.

DOWNSTREAM

Businesses influence the public through customers and social networks in various ways. As businesses respond to consumer demand for sustainable consumption (Tao et al., 2023), they are increasingly using advertising and marketing to promote environmental values and sustainable business practices or products. Advertised Emissions, which claims that advertising is responsible for over 200 Mt of carbon emissions in the UK alone (2021), is an initiative seeking to influence the advertising industry to take responsibility for their impacts on the emissions associated with increased consumption. There is evidence that 'green marketing' (Alkhatib et al., 2023) is effective in promoting the consumption of more environmentally friendly products by consumers (Yang and Chai 2022), and consumers are more loyal to businesses they perceive to be environmentally sustainable (Tao et al., 2023). However, consumers' ability to distinguish the validity and accuracy of environmental claims has also been found to be limited (Lopes et al., 2023), and there exists a 'green gap' between consumers' stated environmental intentions and their behaviour (Fowler and Close 2012). Thus, businesses can be involved in more transparent advertising and stamping out greenwashing for economic and environmental benefit.

As explained above, some businesses have unique power to influence consumers, as *enablers* of low-carbon behaviours. However, as well as solar-installers and heat-pump engineers, other businesses can leverage their unique roles to influence social norms. Hairdressers, for instance, are renowned for conversing with their customers, and a project called 'mirror talkers' promoted by the Green Salon Initiative in the UK seeks to encourage climate-conversations between stylists and clients, using QR codes stuck on mirrors to stimulate discussion (Baden and Prasad 2016).

SIDEWAYS

Peer to peer influence is highly valued by businesses, particularly with regards the adoption of low-carbon practices (Parker et al., 2009). Businesses interact at multiple levels through supply chains, regional networks, online communities, and international connections. Sideways influence works in multiple ways, such as competition, peer learning and direct influence of business-to-business companies. Large corporates seeking to address their Scope 3 emissions are increasingly seeking to engage businesses in their supply chains to both demand and support low-carbon initiatives. IKEA, for example, developed a protocol and associated software platform for specifying environmental and labour standards which suppliers must comply with (Fuchs et al., 2023). Learning Energy Efficiency Networks (LEEN) exemplify how sideways business influence can contribute to reduced emissions (Wohlfarth et al., 2017). Widely deployed in Germany and Sweden, businesses are recruited into cohorts to share knowledge on energy efficiency and carbon-saving initiatives, supported with subsidies and expert advice from regional energy agencies. The LEEN were estimated to have produced a 2.1 % energy efficiency improvement per year across 366 businesses and to have circumvented 5 million tonnes of CO₂ emissions (*ibid.*). Whereas the LEEN model relies on public funding, growing concern for sustainability amongst businesses of all sizes is enabling dedicated green business networks to operate without subsidy. Innova-

tive examples from the UK include Oxfordshire Greentech and Cambridgeshire Cleantech.

INTERNAL

While evidence of the spillover effect is limited, businesses do have direct influence on the behaviour of staff while at work. Examples of positive influences include encouraging staff to reduce energy usage in the workplace; introducing flexible working (Hook et al., 2020) to allow home working and active travel commuting; hosting pro-environmental behaviour, or 'carbon literacy' training (Dumont et al., 2017; Singh et al., 2019); and encouraging employees to continue pro-environmental behaviour at home (Tudor et al., 2007). Evidence from China suggests a positive relationship between CSR and the adoption of green behaviours by employees (Yuan et al., 2023).

Conclusion

This review has categorised five roles that businesses can adopt in their efforts to take action on climate change. Emerging from findings from a UK research project examining the governance of decarbonisation for SMEs, we presented a narrative account which demonstrates that businesses can adopt a range of roles and activities in addressing climate change. Besides mitigating their environmental impacts from direct emissions, businesses are the principal actors responsible for developing and disseminating low carbon goods and services which enable the broader population to make pro-climate choices. They are also often pioneering early *adopters*; yield significant *influence* among their social and professional networks; and act as citizens to protect local environments and communities, and stretch the ambition to act amongst other businesses and governments.

Our aim has been to characterise the broad landscape of choices available to businesses, but we acknowledge that the capacity for pro-environmental action varies across sectors, by location and size of business, and according to local political and economic contexts. There are likely to be significant modifications to the ways that they are constituted across different temporal and spatial scales. Ours is not the only approach to organising the literature and we recognise and anticipate further developments and additions to the roles outlined. This review has focused on evidence from EU and UK, and our evidence suggests that the roles identified are broadly applicable to businesses operating in OECD countries. However, there is considerable scope to explore and debate how these roles and associated activities may differ in emerging economies. Further examples of how this work could be extended include sector orientated reviews with expert knowledge; in depth case studies of business role models of different sizes; empirical studies into each of our presented roles; and policy orientated research surrounding the requirements of governments to facilitate change for businesses to fulfil their roles as climate actors.

Businesses have a critical role to play in combatting climate change and our review has highlighted a wider range of climate-positive activities that businesses can adopt, beyond simply reducing their direct emissions and acting as enablers in the shift to low carbon economies. We hope this contribution will go some way towards countering a concerning tendency for 'green-hushing' by pointing to a broader range of roles and actions that they can adopt, so long as they are transparent,

deliberative and consultative. Other stakeholders, including researchers, policymakers, and the clients, customers and advisors of businesses can help to highlight the multiple capacities in which businesses can act. Exploring interventions which best enable businesses to do so warrants further research and experimentation.

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