

Carbon labels can aid in the fight against climate change

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Responsible consumption and production along with climate action are two of the seventeen Sustainable Development Goals (SDGs) of the United Nations for promoting individual and collective actions to combat climate change. One of the challenges of reaching these goals is to reduce global carbon dioxide (CO₂) emissions and other greenhouse gasses (GHG), which continue to rise. Carbon labelling is a promising alternative intervention for reducing carbon emissions, primarily through stimulating greater demand for goods and services with low or no environmental impacts.

Carbon labelling as an information disclosure summarises data on the greenhouse gases (GHGs) emitted from the production, distribution and use (carbon footprints) of a good or service in a simple indicator presented at the point of purchase. The goal is to facilitate choices that can rapidly reduce GHG emissions to meet the challenges posed by escalating human-caused climate change. Carbon labelling has advantages over many other GHG mitigation initiatives, as it does not require government actions such as

regulations, taxation or financial incentives, each of which faces barriers in many political systems.

Carbon labels can enhance desired behaviour change towards climate friendly consumption among retail consumers by encouraging them to choose low-carbon products. Carbon labelling can also induce retailers and other actors in the supply chain (e.g., corporate buyers, transporters and producers) to provide consumers with low-carbon products, because attention to labelling data can make these organisations more aware of GHG emissions and inefficiencies associated with their products or more concerned about naming-and-shaming or reputation campaigns.

Carbon labelling systems may be sponsored or implemented by governmental, corporate or non-profit organisations, or by collaborations of these organisations. They may target consumer or organisational behaviour and may influence users anywhere in product life cycles. The validity and effectiveness of carbon labelling systems depend on the characteristics of the targeted product or market, availability and accuracy of data, the rules developed to convert data into labels and the procedures employed to develop rules, design labels and modify them as appropriate.

Labels may provide carbon related information in a variety of formats with different levels of details and at varying levels of resolution. As label users differ in the amount of detail they want or can use, labelling systems should offer a level of detail suited to their needs and capabilities. For example, retail consumers have very little time, energy, capability or interest in absorbing detailed information when deciding on a can of beans or a light bulb, so a simple certification or a label with appealing visual may serve them well, given that it is accurate and credible. For larger purchases, such as a vehicle, building or appliance, retail consumers may want to use more detailed information, especially if it is presented in a format that facilitates the kinds of comparisons being used in decision making. For organisational consumers, retailers, producers and intermediaries in supply chains, and governments, all of which have more at stake and more ability to use detailed information than do retail consumers, more detailed quantitative information may help.

Although the responses of retail consumers to labels have been the main subject of labelling research, consumers are not the only, or perhaps even the most promising, target for carbon labels. In fact, carbon labelling can reduce GHG emissions without directly affecting retail consumers' choices in cases such as by inducing changes in supply chains, production processes and product mix to achieve efficiency in meeting environmental quality and hence to improve companies' reputations. Labels may also affect

governments in their roles as regulators, standard setters and consumers of products. Thus, labels can have effects on organizational behaviour beyond those that arise from retail consumer behaviour. As for other climate change mitigation initiatives, carbon labels can be assessed in terms of how much effect they could ideally have, the feasibility of their adoption and the degree to which they produce the intended responses when implemented.

The rapid expansion of the use of digital tools (e.g., barcode, QR code) and platforms (e.g., e-commerce) for various business functions may also increase opportunities for carbon labelling. Digital carbon labelling may be cheaper, easier and more effective than labelling for traditional brick-and-mortar-based commerce. For example, PANGAIA clothing (<https://pangaia.com>), a direct-to-consumer materials science company, has initiated a 'digital passport' (QR code and cloud-hosted digital twin) printed on clothing to indicate its carbon and water footprints. Sheep Inc. (<https://sheepinc.com>), a naturally carbon negative knitwear brand, uses a bio-based near-field communication tag that details the carbon footprint at each stage of the supply chain. Other recent advancements, such as block-chain technology, may also improve the tools for supply-chain management and carbon foot printing. Although digital carbon labelling is promising, further research is needed to explore how it can be applied across an array of GHG-intensive production and consumption activities.

Although carbon labelling systems can aid fighting against climate change by reducing GHG emissions and complement other climate initiatives, they are certainly not sufficient to achieve emissions reduction targets alone. Yet, labelling may be more feasible because it may be seen less restrictive or allowing more time to push product life cycles towards reduced emissions. Labelling can also be implemented by the private sector when governments lack the political support to adopt regulatory measures, and it can have effects that transcend national boundaries even without international agreements. The barriers to labelling may thus be weaker than the barriers to direct government product regulation or carbon pricing. Labelling may also facilitate later government adoption of these approaches. In evaluating mitigation initiatives, it is important to recognize that a somewhat effective label will have greater impact than a stronger policy that is not adopted or adopted at a much later date.

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