A new project to track and value climate innovation in the built world

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Carbon is a universal building block of life—it's in almost every product we make and use, from the cement we walk on to the plastic packaging used for shipping products and the tires on cars and trucks. And while some products are more durable than others, at the end of the product's life cycle, the carbon stored in them is released into our air and oceans as

carbon dioxide. Greenhouse gas emissions from the end of this product value chain are a significant and often overlooked part of our contribution to climate change.

That's why at Columbia University, we're trying to make a better way to track and value climate solutions. Today, with support from Dow and the Nature Conservancy, Columbia's Center on Global Energy Policy announced the launch of the Carbon Accounting Project. The project will build on existing methods to track how and where carbon emissions are both created and reduced at all points of the product life cycle, focusing on emissions reductions made possible through innovation and technology at the later stages of a product's usefulness.

Companies have been counting their emissions for more than two decades using the Greenhouse Gas Protocol developed by the World Resources Institute and the World Business Council on Sustainable Development.

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In simple terms, the protocol allows a company to count emissions based on what the company does, what it buys, and what it makes. These emissions are divided into three simple "scopes":

- Scope 1 counts direct emissions from work in the company. For example, a shoe manufacturer would count scope 1 emissions that resulted from making sneakers in factories.
- Scope 2 counts indirect emissions from operations. In a shoe manufacturer's case, scope 2 includes emissions from the electricity they buy from others to run their factories and heat their buildings.
- Scope 3 counts a bunch of ways a company impacts emissions outside its fence line, most importantly the emissions associated with products it makes—from what goes into them to how they are distributed and used. For the shoe manufacturer, that includes plastic in their shoes and special packaging (paper and plastic) for selling products. Scope 3 emissions are sometimes called the value chain emissions.

This accounting system provides a way to consider the totality of greenhouse gas emissions for a whole enterprise. For some companies, like tech companies, most of their emissions are scope 1 and 2. However, most companies—including energy companies, product manufacturers, and the food industry—find the majority of emissions come from scope 3, and everything ends up in the air and oceans.

Scope 1 and 2 accounting is pretty straightforward—these emissions are the direct result of corporate activities and are measured at the point of

emissions and attributed to the emitter. Scope 3 accounting is more complicated and their attribution is more contentious because they do not occur at the point of emission.

A good example to consider are emissions associated with insulation production and use. Under current scope 3 guidance, a company would calculate, using the best available science, the emissions it used to create, install, use and dispose of the insulation. However, consider a homeowner that can purchase two different kinds of insulation. Both types might have the same carbon emissions in the production, installation, and use stages; however, one insulation may be more effective and thus reduce the need for using heat in the winter or air conditioning in the summer. The homeowner using the more efficient insulation will ultimately generate less carbon through its use, but the company producing that insulation would not be recognized for its more efficient product under current accounting approaches.

Shining a light on hidden benefits

To tackle the global, persistent challenges of climate mitigation, we need innovative solutions of all kinds with lower total footprints. If Product A yields twice the climate benefits through its use than Product B, we want to make and use more of Product A, even if they have the same Scope 3 footprint. However, the current greenhouse gas protocol treats a gallon of gas and a panel of insulation the same way. This is true as well for automobile lightweight composites, batteries for buses, and concrete in a culvert. The potential benefits of different products or materials are currently 'hidden," and so are incentives to focus on innovations that generate these kinds of benefits.

That's a missing catalyst for makers and innovators. The inventors and manufacturers of climate solutions get no acknowledgment for innovation under scope 3 accounting. When Tesla builds a factory to

make electric cars or batteries, its scope 3 emissions go up because it makes more products, even if its products deliver emissions reductions when they are used by customers. The same is true for a home improvement store when it sells LED lightbulbs, or the lightbulb manufacturer when it makes them. It's also not clear who ultimately is responsible for the emissions. An automotive manufacturer's scope 3 emissions may grow when it builds a factory, but the scope 3 footprints of its investors does not.

That's the rub: carbon is not a conventional pollutant like ozone—it's in our bodies, food, beer, and buildings. It's stored in wood products for a century or for a few hours till it's burned. It enters the air and oceans from thousands of pathways that are not smokestacks and tailpipes. This creates problems for the environment, for regulators, and for companies trying to help people around the world. It's part of why we are failing to reduce carbon pollution.

Our new methodology would track how and where carbon emissions are both created and reduced at all points where impacts can be calculated, including emissions reduction benefits at later stages of the product life cycle made possible through innovation and technology. The work would focus on scope 3, with the goal of better reflecting the benefits of the sustainable application.

Many of the key issues are technical. The project will require new data infrastructure and analytics to track, quantify, and understand the upstream, conversion, and use cases with manufacturing and innovation. Making a tire is complicated. So is using insulation and tracking the climate benefits. We can't fix what we can't measure, and we can't incentivize innovation if we don't determine value. We look forward to engaging diverse stakeholders on these issues as the work proceeds.

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