

The carbon case for going green is only half the story

Citizens appreciate green initiatives like electric buses that improve their quality of life. Governments should factor this in when they assess returns on such investments.

Alberto Salvo,
Timothy Wong
and Zhihao Han

Stand at any bus stop as a diesel bus roars away, leaving a plume of hot exhaust fumes. Then watch an electric bus glide past, almost silently, with no tailpipe in sight. Most Singaporeans would say they prefer the second experience. But how much is that preference worth – and are governments systematically counting it?

In peer-reviewed research just accepted for publication by the journal of the Association of Environmental and Resource Economists, we put a number on it – and the answer should change how governments evaluate green investments.

Citizens value each electric bus ride by 11 Singapore cents more than an oil-powered diesel bus ride. Extrapolate by the number of rides each bus will deliver over its lifespan, and the “citizen value” works out to \$340,000 per electric bus procured. Scale to a fully electric fleet of 6,000 public buses and the figure is a staggering \$2 billion.

Here is the striking part. That citizen value of each electrified bus – \$340,000 – exceeds the life-cycle carbon savings of about \$270,000 for each diesel bus that is replaced. In other words, the benefit that Singaporeans experience through quieter, cleaner bus services is worth at least as much as the carbon emissions reduction that typically headlines the case for electrification.

Cost-benefit assessments that consider carbon, but not the value placed by citizens on other factors, offer an incomplete calculus of the social return.

This is not just about buses. It's about how policymakers justify

and communicate low-carbon transitions.

CARBON METRICS: NECESSARY, NOT SUFFICIENT

When governments make the case for climate mitigation investments – whether in transport, energy or food systems – they typically lead with carbon. But these metrics are not what citizens experience day to day. What people notice is whether the buses plying their neighbourhoods are quieter, whether the air at bus stops and adjacent housing blocks is cleaner, whether their energy bills are

lower and predictable, and whether the foods on their plate are healthier. A growing body of research confirms that these everyday co-benefits can exceed the benefits of carbon saving itself.

In a landmark study published in *Nature Climate Change*, Felix Creutzig and colleagues assessed 306 combinations of demand-side climate solutions and found that 79 per cent delivered positive well-being effects.

Linus Mattauch, Cameron Hepburn and Nicholas Stern, writing in *Resource and Energy Economics*, go further: When low-carbon policies change what people experience and prefer, the value of green infrastructure is systematically underestimated if these preference shifts are ignored.

Past socio-economic transitions – from reducing smoking to curbing drink driving – succeeded

partly because preferences changed along the way. Solving the climate crisis will be no different.

If policymakers sell decarbonisation on carbon alone, they are underselling green investments to the very taxpayers funding them.

FINDINGS FROM FIELD DATA

Our research provides direct evidence of this undercut. We collected field data from three separate sources: intercept surveys of 1,300 commuters at bus stops across Singapore, choice experiments at 1,200 homes in a neighbourhood served by a heavily electrified bus line for over a year, and an analysis of 104 million anonymised commuter rides across 15 bus lines over two years.

Our findings were consistent across all three sources: Riders find electric buses substantially quieter and cleaner, residents are willing to pay for the difference, and commuters vote with their feet by choosing electrified routes, even though fares are identical. The 11-cent extra per electric bus ride is equivalent to how much Singaporeans value one minute less of walking to the bus stop in the hot and humid climate.

PATTERN EXTENDS BEYOND BUSES

If citizens value the cleaner, quieter experience of electrified buses this highly, it stands to reason they would value it on school buses carrying their children and on ferry services connecting them to the region.

Piloting electrification of school buses and ferries is a natural next step.

The low-carbon transition extends further – to energy and food. One of us argued in these pages in May that the latest oil market shock, which slapped a \$6 fuel surcharge on a Batam ferry ticket and is raising school bus fares by up to 20 per cent, was a wake-up call to accelerate Singapore's shift away from fossil fuels. The carbon case for that shift is well established. But the everyday case – energy price stability, supply security, not having a crisis in the Strait of Hormuz reach into your wallet – is what hits home for households. Citizens understand that logic instinctively, even when cost-benefit frameworks do not capture it. And the benefits are not evenly distributed: They accrue most to lower-income households who depend on public transport, live near roads, and spend the largest share of their income on energy.

Or consider food. Shifting towards more plant-based diets is one of the most impactful climate solutions available. But carbon concerns will not change eating habits. The challenge for alternative proteins, particularly in a land-scarce city state that imports over 90 per cent of its food, is to match animal products on taste, convenience and price. Singapore-based innovators such as Happie sell plant-based meat and seafood alternatives on the promise of tasty, Singapore-made food that lowers your intake of saturated fat, cholesterol and additives.

Some will ask: Should public spending decisions really hinge on how commuters and neighbourhood residents feel about bus services? The answer is yes – because these are not soft preferences. They are measurable, evidence-based valuations. When commuters choose electrified routes over diesel ones, at the same fare, that is a revealed preference as hard as any market signal.

The deeper point is that preferences are not fixed. When people experience cleaner products, their understanding and expectations shift. This means that early investment in visible green infrastructure – buses whose differences you can hear and smell, energy supplies that will not jolt your pocket, food whose goodness you feel – does not just deliver a one-off benefit. It builds the constituency for further action.

REPORTING THE FULL RETURN

Singapore's electrification of its public bus fleet has come a long way since 2018, when the Land Transport Authority awarded the tender for its first 60 electric buses. Today, 480 electric buses are operating, and the figure will rise to 1,400 once the buses purchased in late 2025 are rolled out in end-2026. The eventual target: all 6,000 buses.

As Singapore approaches its 2027 ASEAN chairmanship – with a platform to shape regional standards – it can set the example by reporting citizen value alongside carbon metrics, so that taxpayers can see the full case for their investment. The same principle applies across the low-carbon transition: In energy, food and urban design, the benefits that citizens actually experience deserve a place alongside carbon in the societal calculus.

The bombing of Iran in 2026, like the invasion of Ukraine four years earlier, reminds us of the cost of continued fossil dependence. The evidence we publish today shows the value citizens place on the alternative. Together, they make a compelling demand-side case: The transition from fossil fuels to a green economy brings co-benefits – in comfort, health, affordability and resilience – for which Singaporeans express a clear mandate to invest.

As Singapore scales from 60 buses to 6,000 in the years ahead, it is reassuring to know that its citizens are already on board.

Alberto Salvo is associate professor and dean's chair in the department of economics at the National University of Singapore's Faculty of Arts and Social Sciences; Timothy Wong is associate professor in the same department; and Zhihao Han is a research fellow at the Asia Competitiveness Institute, NUS.



When governments make the case for climate mitigation investments – such as in transport – they typically lead with carbon. But these metrics are not what citizens experience day to day. What they notice is, for example, whether the buses plying their neighbourhoods are quieter, say the writers. PHOTO: LIANHE ZAOBAO FILE