Activity Levels Across CPAT, SISEPUEDE, CBAM and FTT

Put four climate models on one baseline, and count the carbon price once

Linked climate models disagree before any policy is applied. One driver layer over ten activities puts them on one baseline, applies the carbon price's effect on demand exactly once, and checks that cars stay inside travel.

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Climate Fiscal Policy Brief No. 6.4 · October 2026

Four models, four baselines, and a carbon price counted once, twice or not at all

4

models a ministry might link, each growing activity from different drivers

2 of 4

models whose demand never responds to price (SISEPUEDE, FTT)

3

descriptions of road transport inside CPAT, which need not agree

21 of 71

FTT regions with no car fleet data

Two models can disagree about a carbon tax simply because they disagree about how much driving or steelmaking there would have been without it.

Source: Working paper 6.4, section 2; CPAT-AI, SISEPUEDE and FTT public code (31 Oct 2026).

Each model builds activity its own way, and only two let prices change demand

Model	What drives activity	Demand responds to price?
CPAT	Fuel use with total GDP and prices; population not separated from income	Yes
SISEPUEDE	Travel, freight, household energy, industrial output with income and population	No
CBAM Policy Tool	Output of covered goods with growth forecasts; a domestic carbon price cuts it	Yes
FTT	Demand is a fixed input; prices move technology shares only	No

Mapped onto ten common activities: electricity, passenger travel, cars, km per car, road freight, vans and trucks, home heat, steel and aluminum, cement and clinker, fertilizers.

Source: Working paper 6.4, Table 1. CPAT: World Bank and IMF; SISEPUEDE: RAND and IDB (Kalra et al. 2023); CBAM Policy Tool: paper 6.2; FTT: Cambridge Econometrics and Exeter (FTT_StandAlone).

One rule grows every activity from one forecast and one base year

Three drivers: population, income per person and the cost of the energy service, each with a fixed elasticity.

Activities that follow people (travel, households, cars) grow one-for-one with population; those that follow the economy grow with total GDP.

One forecast for every model: IMF World Economic Outlook for GDP, UN World Population Prospects for population.

Each model keeps its own data and takes the layer's growth from its own last data year.

Source: Working paper 6.4, section 4.

Where the models' own values fail against the evidence, the layer replaces them

Travel: SISEPUEDE's example grows regional travel at 2.64 times income growth with no ceiling; the evidence says mobility rises roughly in proportion with income (Schafer and Victor 2000).

Materials: its example moves every industrial elasticity to 1 by 2050; steel and cement demand rise for decades, then level off (van Ruijven et al. 2016).

Cars: ownership grows about twice as fast as income at low and middle incomes, then saturates (Dargay and Gately 1999).

Electricity: CPAT's elasticity of 0.8 becomes 0.92 at $3,000 per person and 0.48 above $22,000.

Source: Working paper 6.4, Table 2; SISEPUEDE example data; CPAT-AI elasticity table and income factor.

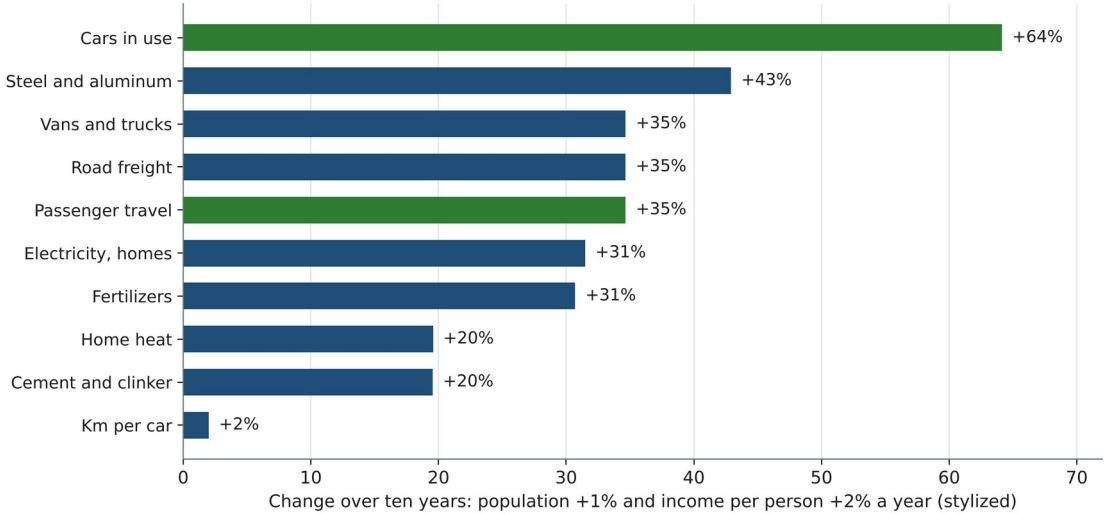
Count the carbon price's effect on demand exactly once

Model	Has its own price response?	What the layer passes
CPAT	Yes	Baseline only; road vehicles too, or the response doubles
CBAM Policy Tool	Yes	Nothing for prices; it sends product output back
SISEPUEDE	No	Activity with the layer's price response
FTT	No	Activity with the layer's price response

A 20% rise in the energy cost of driving cuts car use about 5% (4.5% fewer cars, 0.9% less driving per car); a 20% rise for freight cuts tonne-km about 2%.

Source: Working paper 6.4, Proposition 2 and Table 3; Goodwin, Dargay and Hanly (2004); de Jong et al. (2010).

Under stylized growth, cars in use rise 64% in ten years and travel 35%



Change over ten years; population +1% and income per person +2% a year (stylized).

Cars outrun travel: the car share of travel rises by about a quarter in a decade.

Population matters where income elasticity is not 1: up to 0.4 points a year (cement).

Heavy industry: output elasticities are judgment values.

Source: Working paper 6.4, Table 3 (2.Source/activity_layer.py).

Left unchecked, car travel overtakes all travel, even with a saturating ownership curve

Constant elasticities: a 30% car share of passenger travel reaches 100% in about 56 years at 2% income growth.

CPAT's Gompertz ownership curve does not prevent it: the crossing still comes in year 54, at 363 vehicles per 1,000.

The fix: check every year that cars × km per car × occupancy stay below total travel, and let km per car adjust.

Source: Working paper 6.4, Proposition 3 and Appendix A.

The data gaps bind as hard as the method

FTT: no car fleet data for 21 of 71 regions (Nigeria, South Africa, Pakistan and Kenya among them); industrial heat ships without data; steel only inside E3ME-FTT.

SISEPUEDE: one public example country; country calibrations are not public.

CPAT: co-benefits always use the engineering road model's driving, whatever road model is selected (issue I100).

The strongest objection, that a rule-based link is second-best to solving models together: none of the four was built for that, and written rules are easier to audit.

Source: FTT_StandAlone inputs (commit 896a3ce); SISEPUEDE repository; CPAT-AI issue register v1.1.0.

What to do

What the paper shows

One layer: ten activities, one rule, one forecast, one base year.

Price once: in SISEPUEDE and FTT through the layer; in CPAT and the CBAM tool, not.

Cars inside travel: +64% against +35% in ten years; check every year.

Gaps: FTT's missing car data; private calibrations; industrial elasticities.

Actions

Finance ministries: ask whether models share drivers and where the price response sits.

Teams running the models: link through one layer; select CPAT's road model whenever co-benefits are reported.

Developers and CPAT-AI: fill FTT's car data, publish calibrations, run one country through all four.