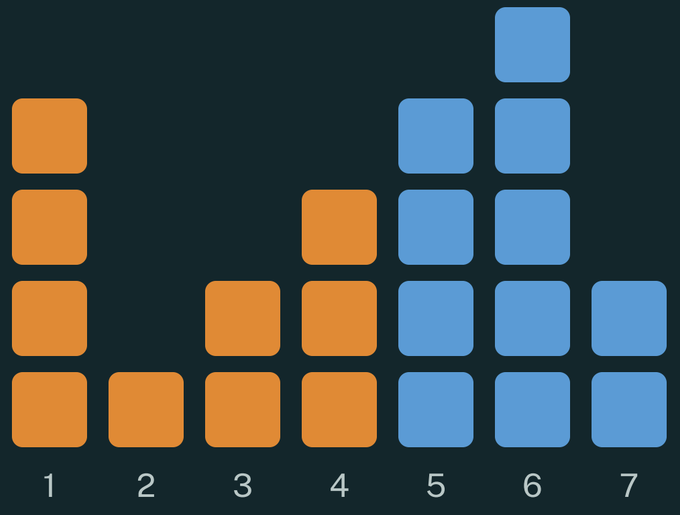
RESEARCH PORTFOLIO · OCTOBER 2026

Climate, Fiscal & Finance

Papers for finance ministries and development banks on carbon pricing, tax, clean-power finance and the models behind them.

Stephen Stretton
climatefiscalfinance.org



Climate policy fails less for want of the right price than for want of feasibility

01

Political

Who wins and who loses decides which policies survive.

02

Financial

The cost of capital and fiscal space decide what gets built.

03

Energy system

A slow-moving capital stock and electrification set the pace.

Finance ministries and development banks can relax all three constraints. Each paper is one piece of that argument.

Two parts, seven sections, 21 papers

PART I · POLICY AND FINANCE

1 **Carbon Pricing**
Price production and consumption separately

2 **Other Tax and Fiscal Policy**
Tax rent, not effort

3 **Finance and Risk**
Make clean power an asset class

4 **Sovereign Incentives**
Reward governments, not projects

PART II · MODELLING AND ANALYTICS

5 **Modelling (CPAT)**
Models a finance ministry can audit

6 **Modular Upgrades**
Extensions to CPAT where policy needs them

7 **Analytics Tools**
Diagnostics on data ministries already hold

\+ **Books and other papers**
Three books and an earlier paper

OVERVIEW · HEADLINE RESULTS

Six headline results

$15 vs $85

Rise in the steel price per tonne: a feebate versus a tax at the same rate

1 · Carbon Pricing

~ ¼

Cut in the cost of solar power from pooling and refinancing built plants

3 · Finance and Risk

80×

Incentive per donor dollar when guarantees replace cash (2.7× under stress)

4 · Sovereign Incentives

228

Bugs in the legacy CPAT model found by two AI-assisted rebuilds

5 · Modelling (CPAT)

$37 vs $21

Effective versus explicit carbon price per tonne of a stylized policy mix

6 · Modular Upgrades

217

Economies profiled from public data by a build anyone can rerun

7 · Analytics Tools

PART I

Policy and Finance

Ten papers for finance ministries and development banks, each with slides, a policy brief and a full paper.

1

Carbon Pricing

4 papers

2

Other Tax and Fiscal Policy

1 paper

3

Finance and Risk

2 papers

4

Sovereign Incentives

3 papers

PART I · SECTION 1

1

Carbon Pricing

Carbon prices stay low because one instrument does two jobs: cut emissions per unit of output, and charge buyers for carbon. Give each job its own instrument.

$15 vs $85

Rise in the price of steel per tonne in a stylized sector: a feebate versus a tax at the same rate

PAPERS

1.1 Price production and consumption separately

1.2 Feebates

1.3 Converting a VAT into a destination carbon tax

1.4 Credit the price signal, not the payment

Price production and consumption separately

One carbon price is asked to do two jobs. Give each job its own instrument.

PROBLEM	A tax on production charges exporters and spares imports, so rates stay low.
PROPOSAL	A feebate for production; a carbon component of VAT and supplier obligations for consumption.
RESULT	Climate finance above half the feebate rate makes adoption a net gain.

TWO TRACKS

PRODUCTION

Feebate on emissions intensity

Full price at the margin, no cost to the treasury

CONSUMPTION

Carbon in VAT + supplier obligations

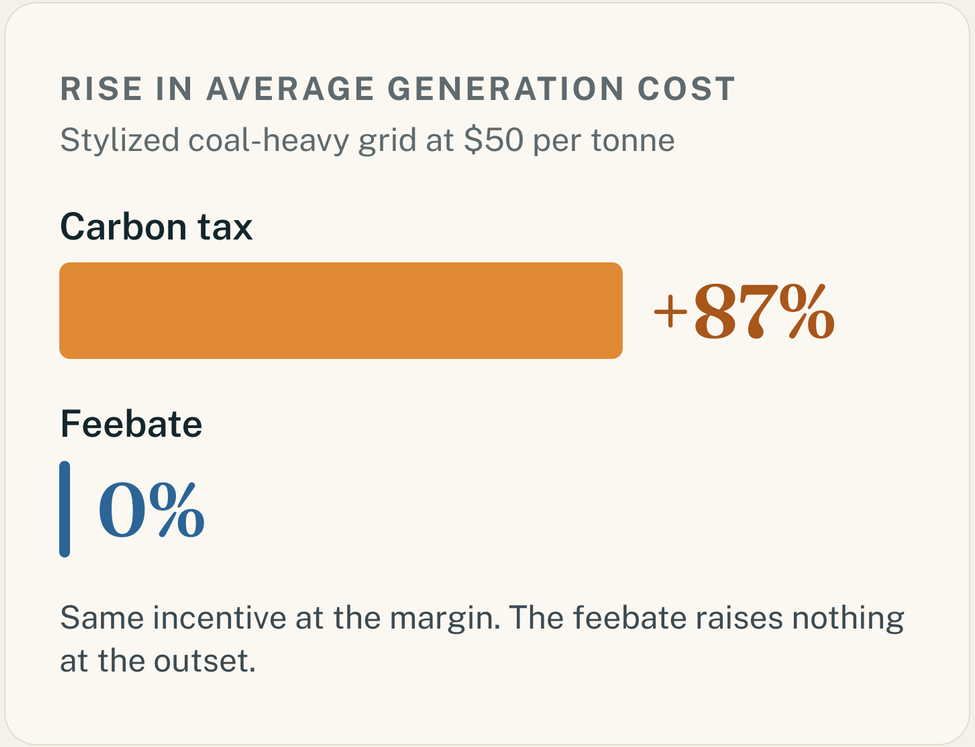
Imports pay too

At the border, charges set by country turn leakage into a race to the top.

Feebates: the full carbon price at the margin, without the carbon bill

Charge producers above a sector benchmark; rebate those below it.

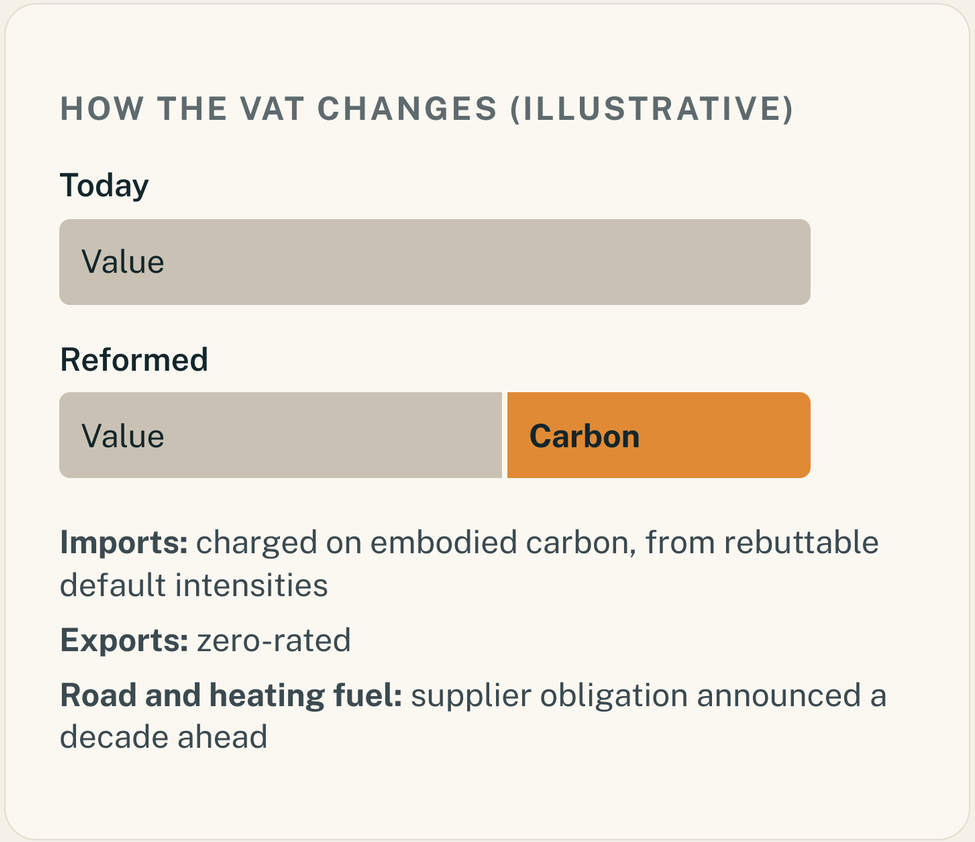
PROBLEM	Carbon taxes stall where coal dominates power or industry competes abroad.
PROPOSAL	A revenue-neutral feebate on emissions per unit of output.
RESULT	The same incentive to switch as a tax, with average costs almost unchanged.



Converting a VAT into a destination carbon tax

The EU prices the carbon its plants emit, but barely the carbon in what Europeans buy.

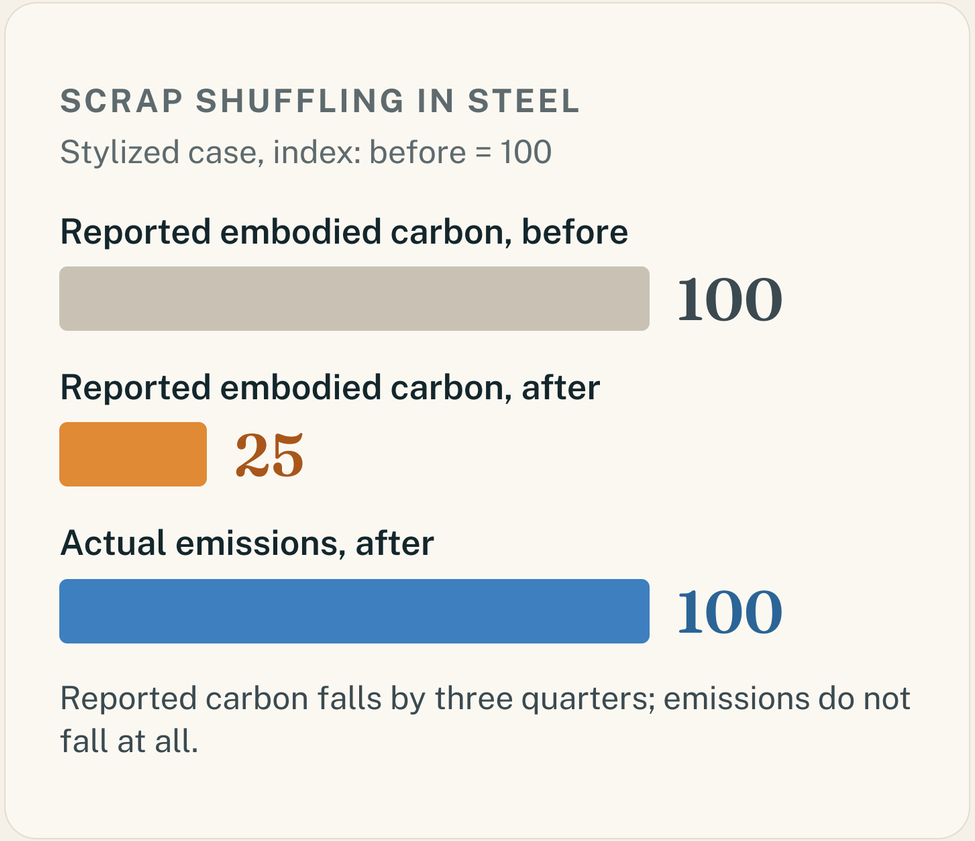
PROBLEM	Much of the carbon in EU consumption is emitted abroad and goes unpriced.
PROPOSAL	A carbon component of VAT on every good consumed, as the value component falls; a forward obligation on fuel suppliers.
RESULT	The VAT part probably needs unanimity; the supplier obligation does not.



Credit the price signal, not the payment

Two flaws in the EU's Carbon Border Adjustment Mechanism, and one fix.

PROBLEM	Feebates, rebated taxes and subsidy reform send a full price signal but earn no credit.
PROPOSAL	Measure the price signal at country-sector level, in the 2027 default-value revision.
RESULT	It also closes "scrap shuffling": routing low-carbon steel to the EU and the rest elsewhere.



2

Other Tax and Fiscal Policy

Mobility binds only on the wrong base. Economic rent can be taxed heavily without driving anything away.

Land can’t move

And market power earned in a country’s market is earned from its own customers.

PAPER

2.1 Taxing rent, not effort

Taxing rent, not effort

Land and corporate taxes that hold up when capital and people move freely.

PROBLEM	Mobile income is hard to tax at high rates, so governments give up on high rates altogether.
PROPOSAL	Tax economic rent, the return above what an investor needs to stay.
RESULT	High rates on the right base, without driving capital or people away.

FOUR INSTRUMENTS

1. Land value tax above a household allowance
2. High rate on profits above a normal return
3. Destination tax on mobile, rent-bearing sectors
4. Sales tax with deductions for local investment and jobs

PART I · SECTION 3

3

Finance and Risk

Clean power is cheap to build and dear to finance. Remove payment risk at its source, then turn projects into standard securities.

~11%

Added to a solar tariff by the payment-risk premium

~ ¼

Cut in the cost of solar from refinancing pooled plants

PAPERS

3.1 Guarantee the contract, not the debt

3.2 From projects to asset classes

Guarantee the contract, not the debt

A payment intermediary removes offtaker risk at its source.

PROBLEM	Investors price the risk that a state-owned distribution company pays late or not at all.
PROPOSAL	Buy power under one standard contract, pay generators in full and on time, recover arrears itself.
RESULT	India’s Solar Energy Corporation shows it works, and that utility reform must go alongside.



From projects to asset classes

Standardization, not subsidy, lowers the price of clean power.

PROBLEM	Projects are financed one at a time, so lenders price every risk together.
PROPOSAL	Banks finance construction; completed plants are pooled and refinanced as standard securities.
RESULT	Refinancing at that cost cuts the price of solar power by about a quarter.

THE POOL'S CAPITAL STACK



Senior synthetic sovereign bond
Near-AAA

Thin mezzanine

First-loss equity

5–8% subordination makes the senior bond near-AAA at moderate default correlation.

4

Sovereign Incentives

The benefits of cutting emissions are global, the costs national. Reward governments with cheaper borrowing, not cash.

80×

Incentive per donor dollar from guarantees, on development banks' own loss record. 2.7× in a stress case.

PAPERS

4.1 Reward the stock as well as the flow

4.2 The Climate Investment Trust

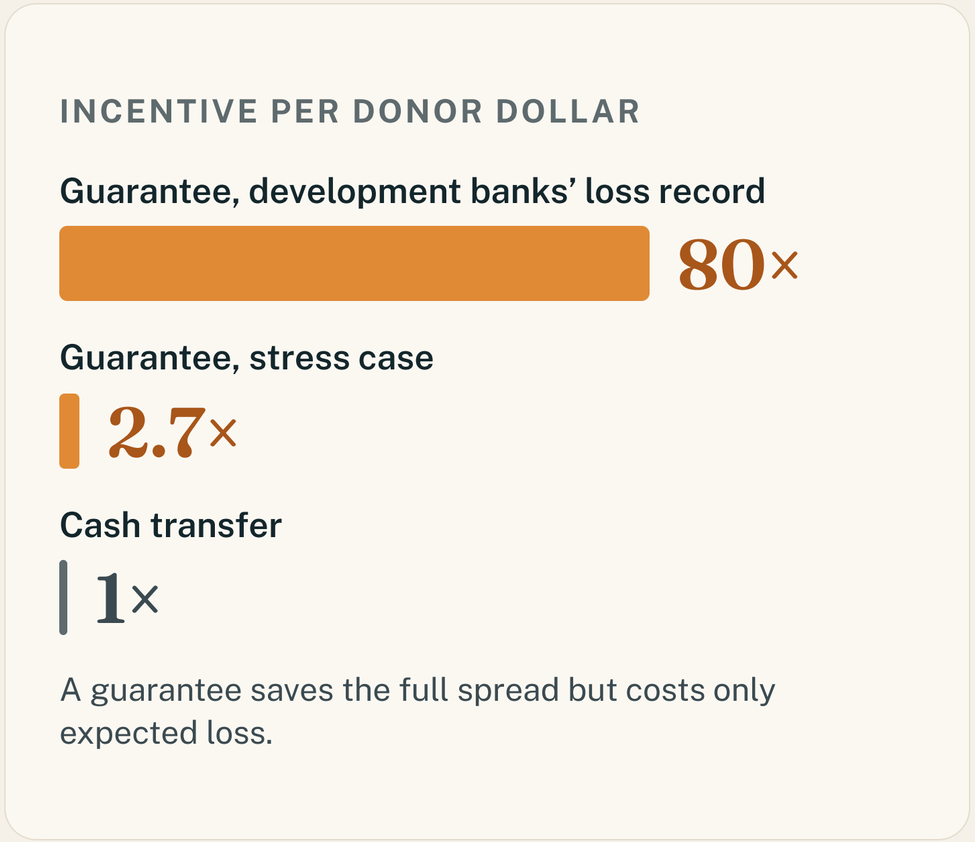
4.3 Codify sustainability-linked sovereign lending

4.1 · SOVEREIGN INCENTIVES

Reward the stock as well as the flow

Turn a country's carbon stock into guarantee capacity, not cash.

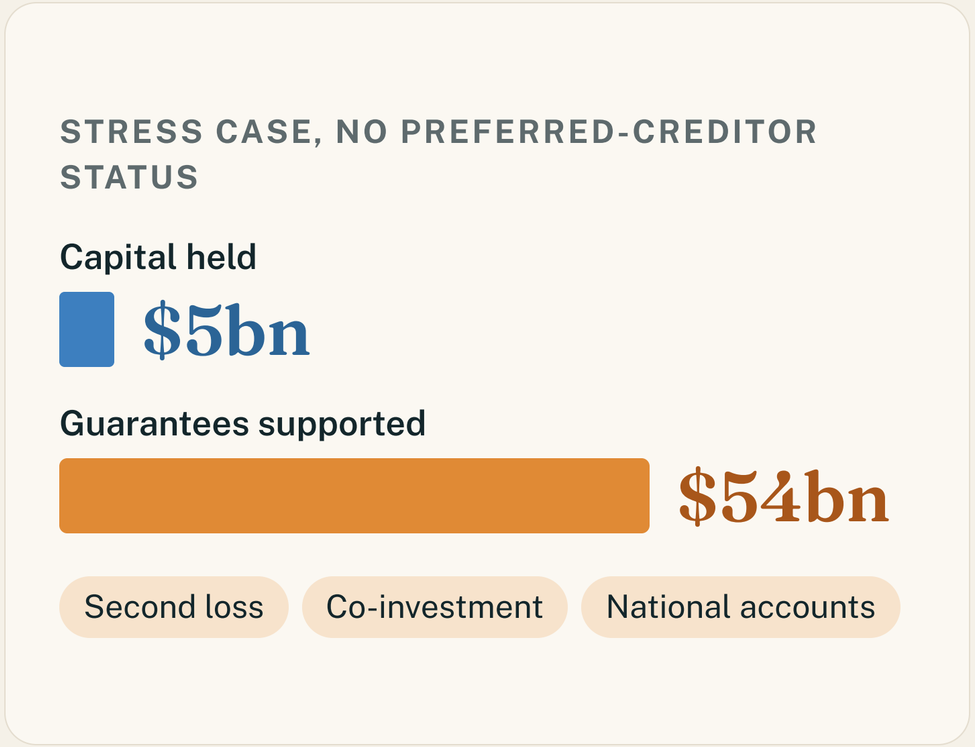
PROBLEM	Climate finance pays for marginal tonnes against baselines nobody can observe.
PROPOSAL	A notional capitalized value: a balance opened by the carbon stock, debited for tonnes above an allowance.
RESULT	For a forest country with Guyana's stock, a $5 billion balance prices emissions at about $30 a tonne.



The Climate Investment Trust: hold capital, lend its strength

A buffer fund that insures policy guarantees instead of spending its capital.

PROBLEM	Donors won’t vote for large transfers; governments can’t borrow against promises.
PROPOSAL	One pool takes second loss on guarantees, co-invests in clean energy and holds national accounts.
RESULT	About $80 of interest savings per donor dollar. Growth needs fee income, not just a buffer’s yield.



Codify sustainability-linked sovereign lending, then give it scale

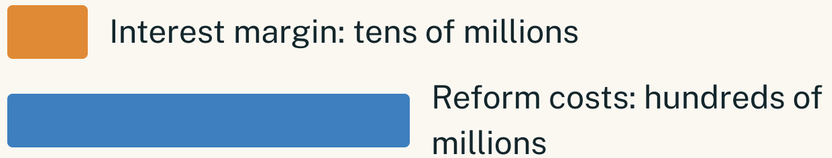
Standardize the instrument, then make guarantee capacity the reward.

PROBLEM	Debt that ties the interest rate to climate indicators is rare, bespoke and small.
PROPOSAL	Standard outturn indicators, verification from published data, a published pricing schedule.
RESULT	Investors get a fixed coupon; a trusted intermediary pays the reward.

$12.5m

The most Uruguay can save from its 2023 sustainability-linked World Bank loan, the leading example.

ORDERS OF MAGNITUDE



Three books and an earlier paper

Time and Chance

The Elements of Scale in the Green Transition

Why clean energy costs too much where it is needed most, from the price of money to institutions.

The Right Policy at the Wrong Time

Carbon Pricing and the Order of Things

The carbon price won the argument and lost in practice. The case for feebates and sequencing.

Plucked!

A fair, simple, efficient and politically feasible tax and benefits system

With Gordon Styles, 2020. UK tax and benefit reform, readable online chapter by chapter.

SLIDIs

Sustainability-Linked Intermediated Debt Instruments

With Marcello Estevão and Nils Zimmermann. Cheaper borrowing that rewards agreed progress.

PART II

Modelling and Analytics

Eleven papers on models and diagnostics a finance ministry can audit, each with slides and a full paper.

5

Modelling (CPAT)

4 papers

6

Modular Upgrades

5 papers

7

Analytics Tools

2 papers

CPAT: the Climate Policy Assessment Tool of the World Bank and IMF

5 Modelling (CPAT)

A model a ministry can use must be small enough to state on a few pages, built at least twice, and tested against data and other models.

228

Bugs found in the legacy model by two AI-assisted rebuilds, 24 of them serious enough to change standard results

PAPERS

5.1 The CPAT mitigation module

5.2 CPAT-AI: rebuilding a policy model

5.3 Validating CPAT

5.4 Are CPAT’s price elasticities right?

The CPAT mitigation module: methods in brief

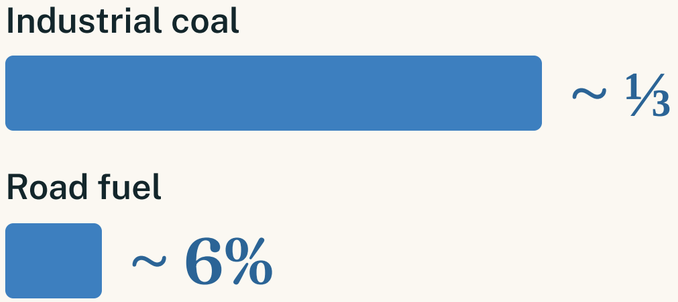
57,000 words of documentation, restated in one place from the tested model.

PROBLEM	The published documentation is long, and parts of it disagree with the model.
PROPOSAL	State the method once, with the corrected equation wherever the documentation is wrong.
RESULT	A penalty-based investment rule, proposed as an alternative to the logit share rule.

HOW THE MODULE RUNS

Prices → Fuel use → Power → Emissions, revenue → GDP

WORKED EXAMPLE: A CARBON PRICE CUTS



CPAT-AI: rebuilding a policy model as a transparent, testable tool

Rebuilt twice with AI coding agents, in Excel and in Python, number for number.

PROBLEM	The legacy workbook is too large for anyone to audit cell by cell.
PROPOSAL	Fix legacy errors, never copy them; copy intended choices and log them.
RESULT	Specify models by shared variable codes, build them twice, and test every change.

228
Bugs in the legacy model, 24 of them serious

135
Questionable but intended choices, copied and logged

20
Errors in the published documentation

7
Bugs in the first rebuild, found by the second

Validating CPAT: baselines, back-casts and model comparisons

How far can a finance ministry trust the numbers?

PROBLEM	Ministries rely on CPAT's numbers, but its validation is scattered.
PROPOSAL	Gather the published checks in one place and separate four tests.
RESULT	Results are most sensitive to price elasticities. Rerun the checks now the 228 bugs are fixed.

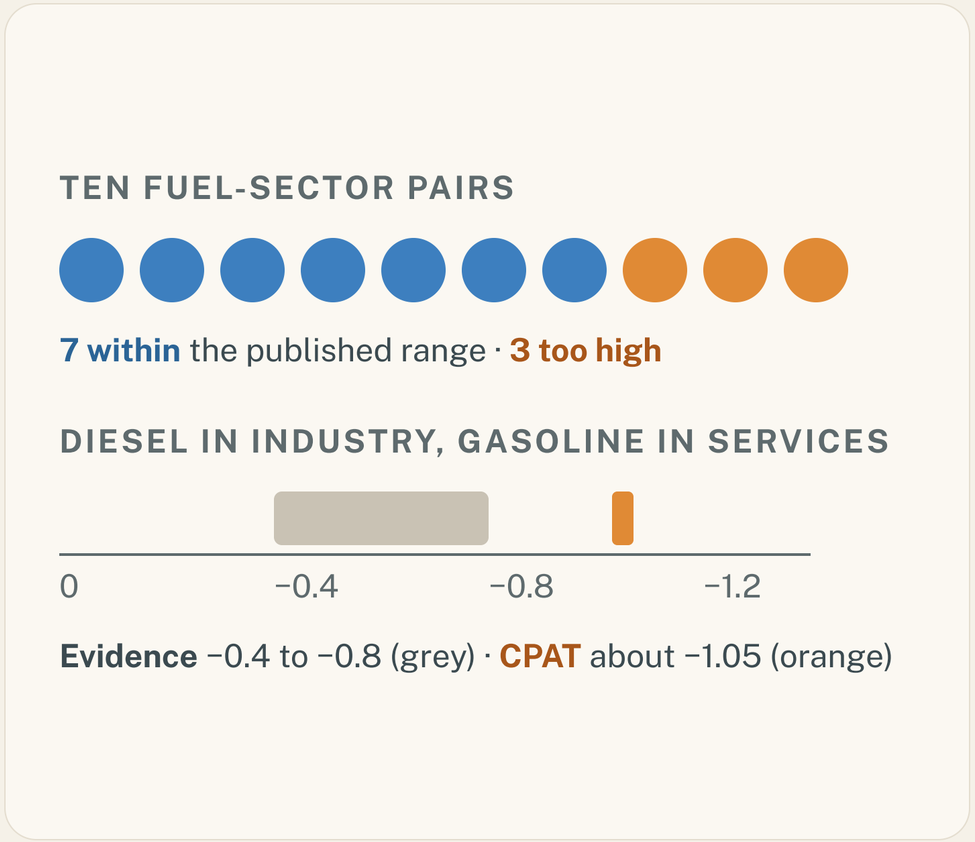
FOUR TESTS

1. **Base-year fit**
   Reproduced by construction
2. **Back-casts from 2000**
   Trend followed for Australia, the US and South Africa; China missed
3. **Model comparison**
   Same order as the IEA, Enerdata and a World Bank power model
4. **Replication**
   Rebuilt versions match to many decimal places

Are CPAT's price elasticities right?

Every price change becomes an emission cut through one table. Check it against the evidence.

PROBLEM	Every result rests on default long-run own-price elasticities, with no cross-price terms.
PROPOSAL	Test each fuel-sector default against meta-analyses; set a protocol for future updates.
RESULT	The full long-run response arrives in one year, overstating five-year responses by half or more.



6

Modular Upgrades

Ministries ask questions CPAT's core can't answer. Each upgrade bolts on, adds one piece of economics and states it in a few checkable equations.

$37 vs $21

Effective versus explicit carbon price per tonne of a stylized policy mix

PAPERS

6.1 Measure carbon pricing by the emissions it cuts

6.2 The CBAM Policy Tool

6.3 Public investment in CPAT

6.4 One activity layer for four models

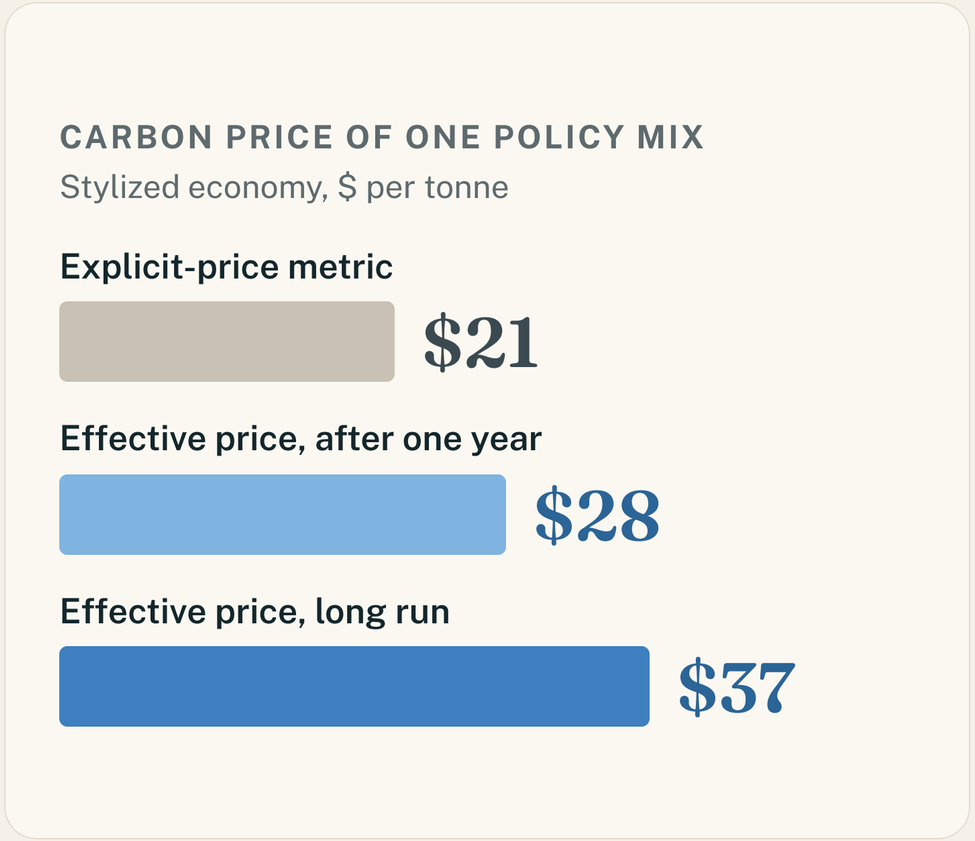
6.5 The Macro-Fiscal-Energy Scenario Tool

6.1 · MODULAR UPGRADES

Measure carbon pricing by the emissions it cuts

The Total Effective Carbon Price: the one carbon tax that cuts as much as the actual policy mix.

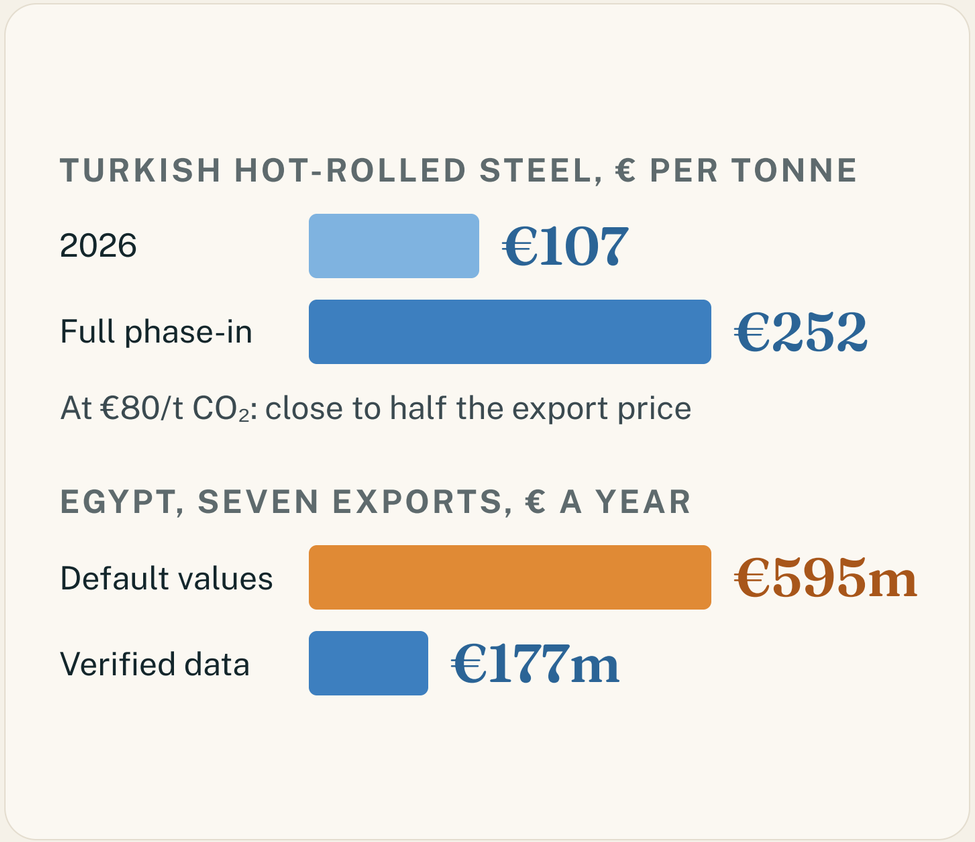
PROBLEM	Standard metrics add up explicit prices, so a feebate or a clean-fuel standard scores zero.
PROPOSAL	Weight each instrument by how strongly emissions respond to it.
RESULT	One scale for policy crediting, border recognition and country diagnostics.



The CBAM Policy Tool

Exporters' exposure to the EU border charge, product by product and year by year.

PROBLEM	The charge is large, rises every year to 2034, and depends on choices governments control.
PROPOSAL	A spreadsheet tool showing how emissions data, a domestic carbon price and rebates change it.
RESULT	Verified emissions data matters most, above all where a country has no default value.



Public investment in CPAT

What will the clean capital cost, and should the budget pay for it?

PROBLEM	Carbon pricing models say what a policy raises and cuts, not what its capital costs.
PROPOSAL	Price investment needs at three rates; test each public dollar against the cost of raising tax.
RESULT	A $108m island solar plant fails on a seven-year loan; a concessional loan or guaranteed PPA rescues it.

4–5%

of GDP: 2030 investment needs in Kenya, Uganda and St Lucia

12.6%

Cost of capital above which a stylized clean asset fails the financial test

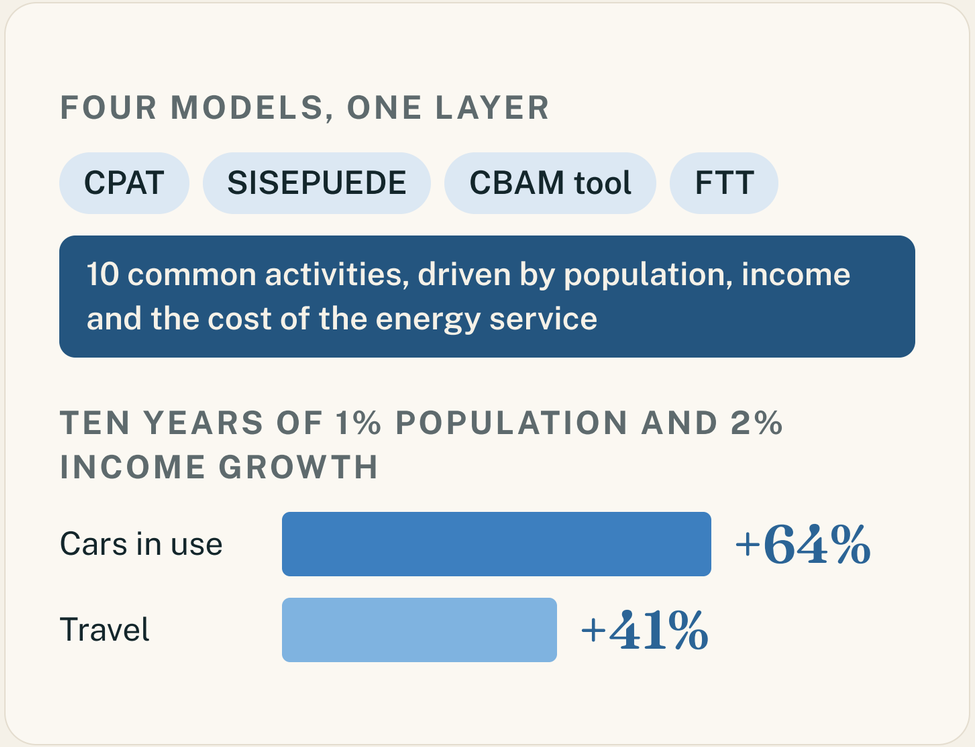
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Share of Uganda's net-zero benefits that reach the budget as cash

Activity levels across CPAT, SISEPUEDE, CBAM and FTT

One driver layer, so four climate models can be linked.

PROBLEM	Four models build electricity use, travel and industrial output in incompatible ways.
PROPOSAL	Map each onto ten common activities driven by one constant-elasticity rule.
RESULT	The models link without counting a price response twice.



The Macro-Fiscal-Energy Scenario Tool

Investment, carbon pricing, growth and debt in one workbook for 186 countries.

PROBLEM	Cost, revenue and debt answers come from separate teams using separate models.
PROPOSAL	Chain investment needs, a carbon-pricing screen, lite IMF and World Bank models and a debt test.
RESULT	How a program is financed matters more than its size.

KENYA: A NET-ZERO PROGRAM

0.5%

of GDP: budget need in 2030, mostly land-use and non-CO_2 spending

~5%

of that need covered by feasible power-sector carbon pricing

+7 pts

of GDP added to public debt by 2050, for little growth

7

Analytics Tools

Analysis changes policy only when the people who hold the budget can reproduce it. Both tools run on data ministries already hold.

217

Economies with a one-page fiscal and energy profile, rebuilt by a script anyone can rerun

PAPERS

7.1 The Excise-Fiscal Diagnostic

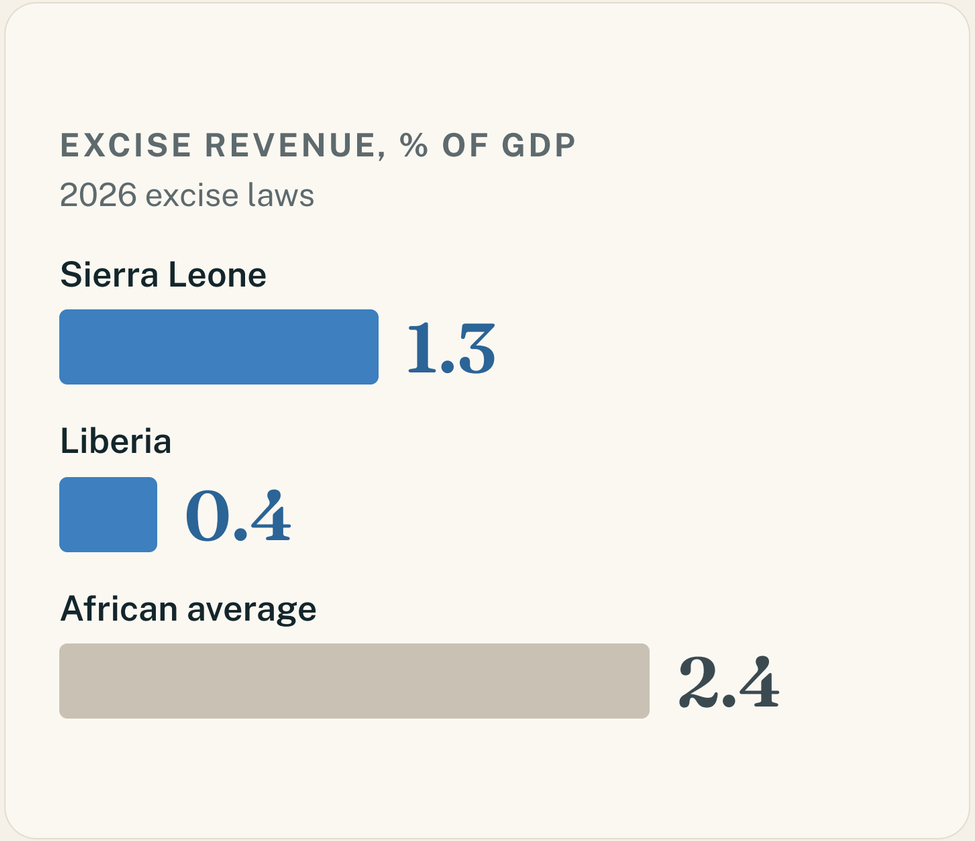
7.2 A global fiscal indicators dashboard

7.1 · ANALYTICS TOOLS

The Excise-Fiscal Diagnostic

Read a whole excise schedule against the damage taxed goods do.

PROBLEM	Few ministries can say whether their excise rates are high or low against that damage.
PROPOSAL	Map every line onto 30 standard lines; benchmark fuels on carbon, pollution, accidents, congestion and roads.
RESULT	Petrol taxed at $0.23 and $0.095 a litre; health excises weakly collected or untraceable.



A global fiscal indicators dashboard for climate-fiscal analysis

A one-page fiscal and energy profile for any economy, from public data.

PROBLEM	A comparable country view takes days to assemble from a dozen databases.
PROPOSAL	A scripted build that never imputes and records the year and source of every value.
RESULT	It tells a revenue problem from a debt-service problem, and points each to a different lever.

217
Economies covered

~20
Public datasets, from the IMF, World Bank, PEFA and Ember

80
Indicators in twelve blocks

1–10
One common scale for every score

READ THE WORK

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Every paper has its abstract online, with slides and a full paper to download. Most policy papers also have a short brief.



Stephen Stretton

Climate, fiscal policy and finance

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