Building country capacity for carbon pricing in PMI countries

The Climate Policy Assessment Tool (CPAT)

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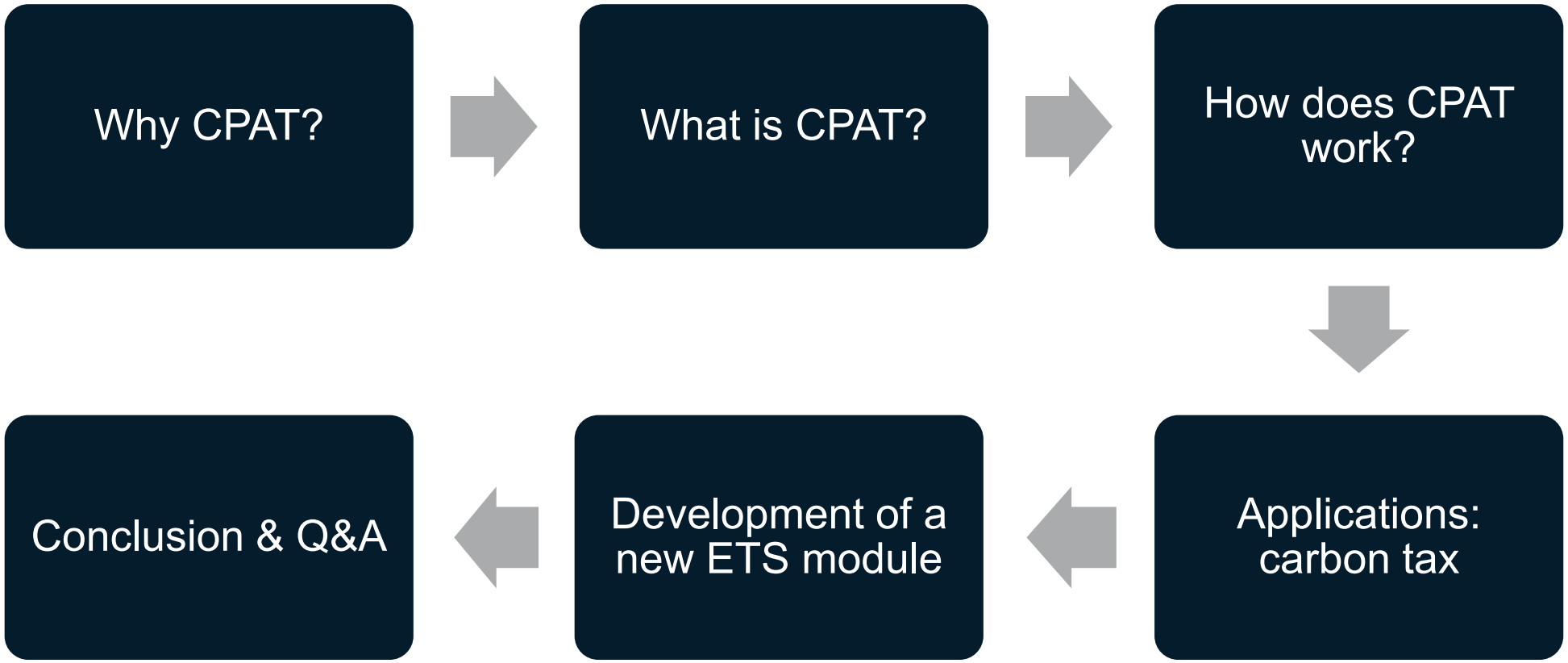
December 2025

WORLD BANK GROUP
Climate Change

PMI
PARTNERSHIP FOR MARKET IMPLEMENTATION

Roadmap for today's talk:

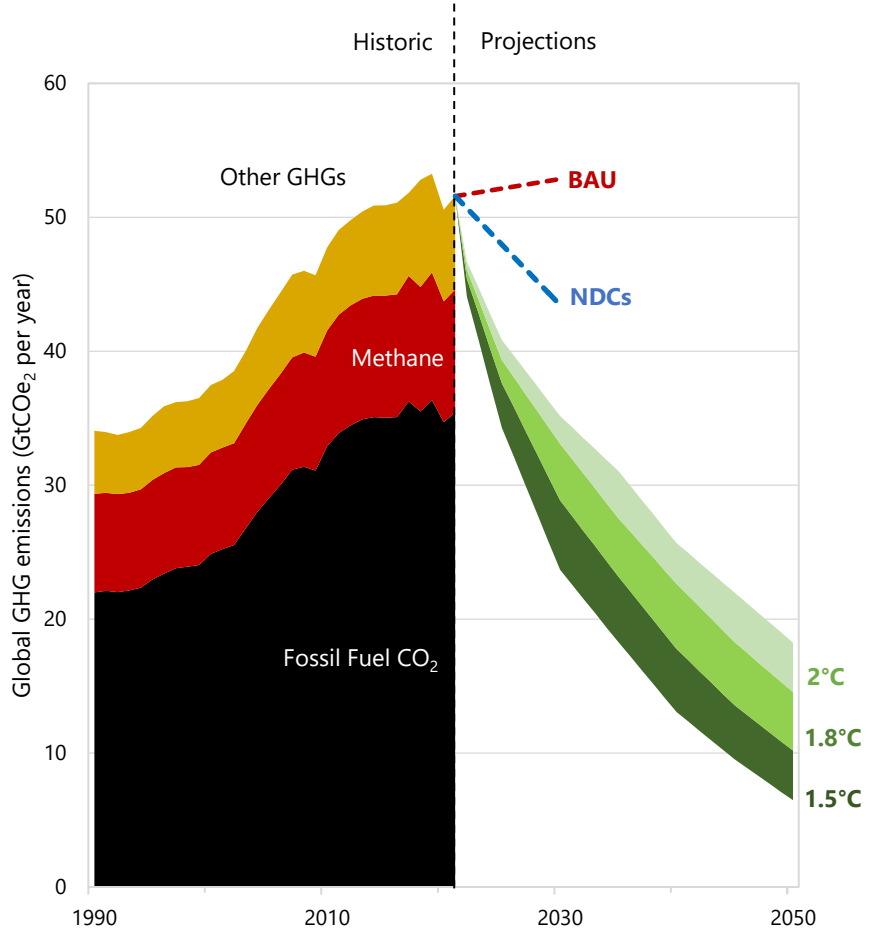


Why CPAT?

Problem: we need to cut global GHG emissions drastically and…

Historical and Needed Annual Global Greenhouse Gas Emissions (1990-2050, GtCO2/yr)

Emissions of greenhouse gases must be cut 25-50% by 2030 compared to 2019 and net-zero by ~mid-century to stabilize the climate (1.5-2°C per Paris Agreement)



Source: IMF & WB Staff using CPAT, IPCC (2022). NDC = nationally determined contribution (country emissions targets); BAU = business-as-usual.

… to tackle other issues

Tax Gap
(Market Efficiency)

Revenue
Generation

Growth, Household
Impacts, and Air Pollution
Benefits of Climate Policy

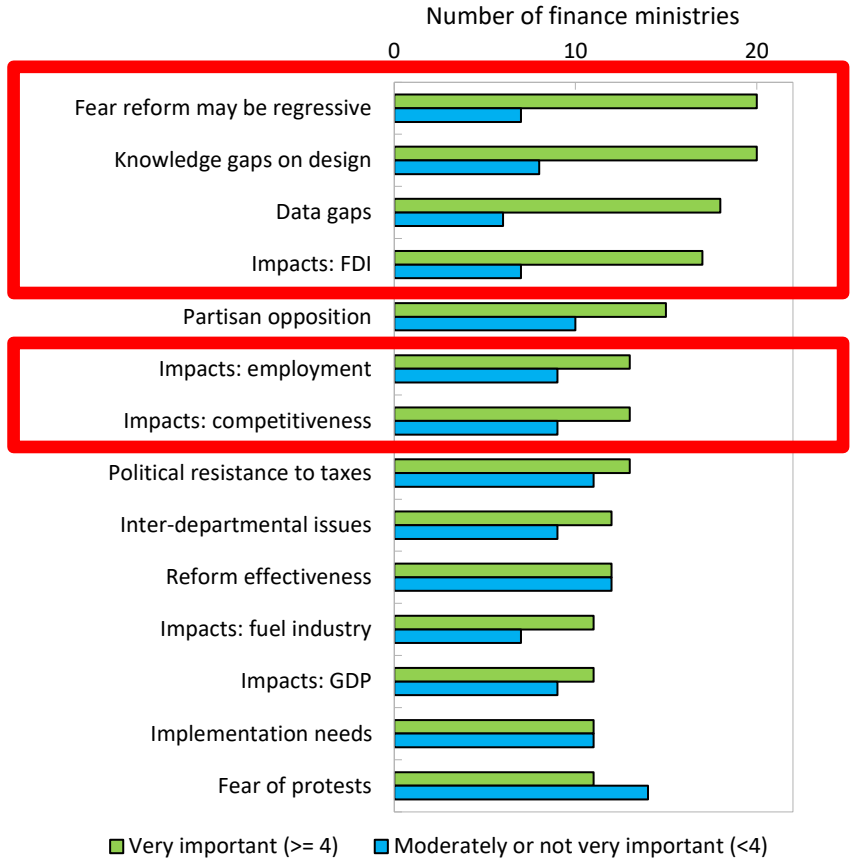
Knowledge Gap

CPAT provides multiple results in one place

Solution: policy change...

… but knowledge gaps on effects, design, and data create obstacles

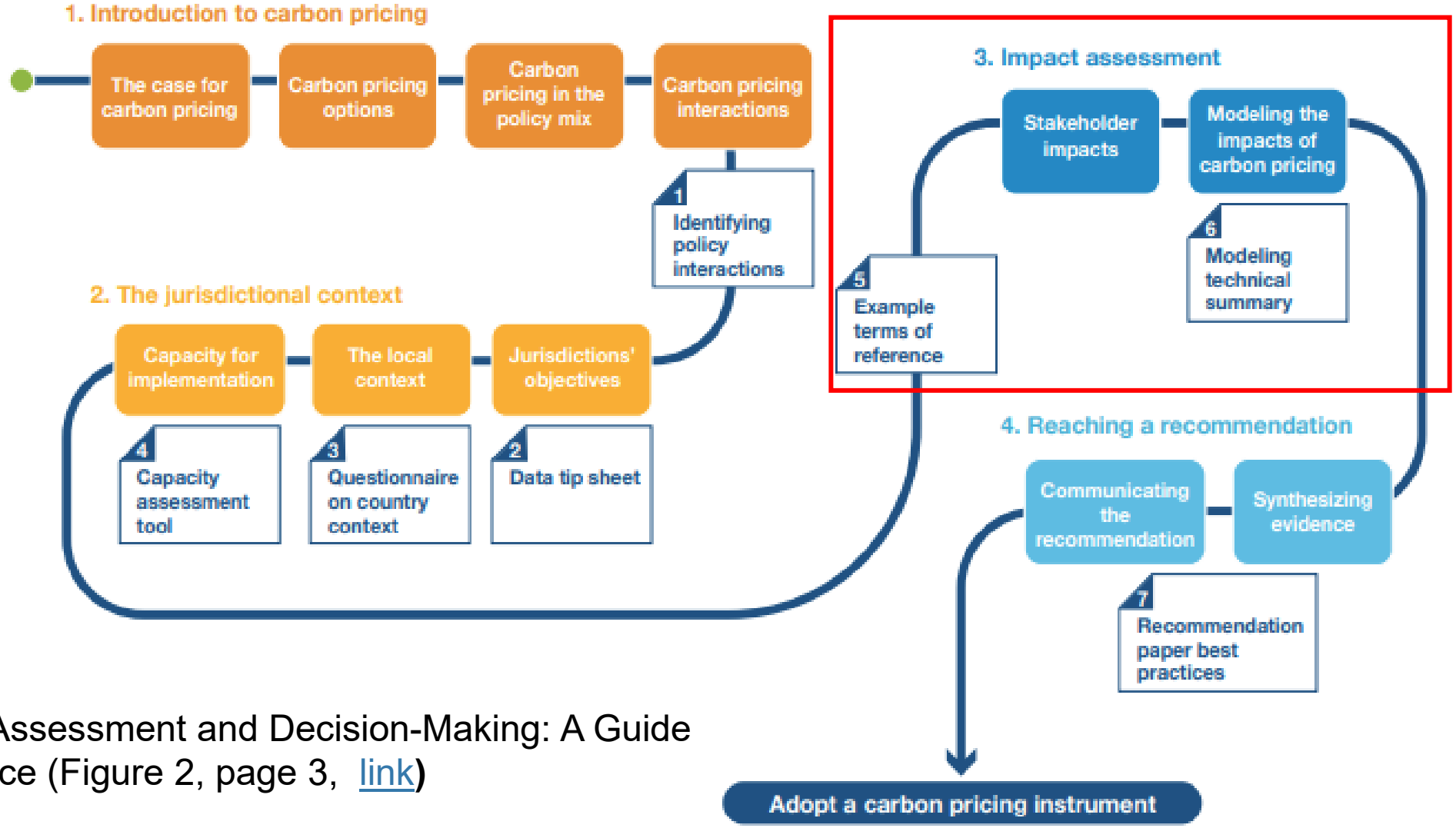
Question to ~30 Finance Ministries:
*"Please rank the following **obstacles to implementing a carbon price or reforming fossil fuel subsidies** from 1 to 5 (1 being not very important, 5 being very important)?"*



Source: IMF-WB survey of *Coalition of Finance Ministries for Climate Action* members, 2020

CPAT Within the Policy Development Process

CPAT aims to cover **Impact Assessment** (stage 3) in the typical policy development process



Source: Carbon Pricing Assessment and Decision-Making: A Guide to Adopting a Carbon Price (Figure 2, page 3, link)

What is CPAT?

What is CPAT?

About the Climate Policy Assessment Tool (CPAT)

CPAT is a **spreadsheet-based tool** for **190 countries:**

- **Developed jointly** by IMF & WB for internal and govt. use.
- **Evaluate policies** to meet **climate**, **fiscal**, **devt**. goals.
- **Methodology:** Price/GDP **elasticities**, **power sector** model, **GDP multipliers**; **distributional** & **air pol**. modules

Rapid impact assessment:

- Energy & emissions
- Macro and fiscal
- Distributional effects
- Co-benefits (e.g., air pol.)

Used in reports such as:

- Country Climate Development Reports (CCDRs)
- Public Finance Reviews
- PMI TA (e.g., Azerbaijan)
- Also, *ad hoc* requests

CPAT Key Benefits:

- **Quick, Flexible:** CPAT can **evolve** with client demand
- High **Country Availability**
- **Many Impact Metrics** (co-benefits)
- IMF-WB **Joint Tool**
- Existing studies in **72 countries**

CPAT Scope & Caveats:

- Policy focus is **carbon pricing instruments**
- Offsets **not covered**
- CPAT has a relatively **simple approach** to energy, emissions and GDP.
  - CPAT is a **medium-term tool** (next 15 years): other models are better for long-term scenarios
  - CPAT **does not replace** other (e.g., macroeconomic / technoeconomic) **models**.

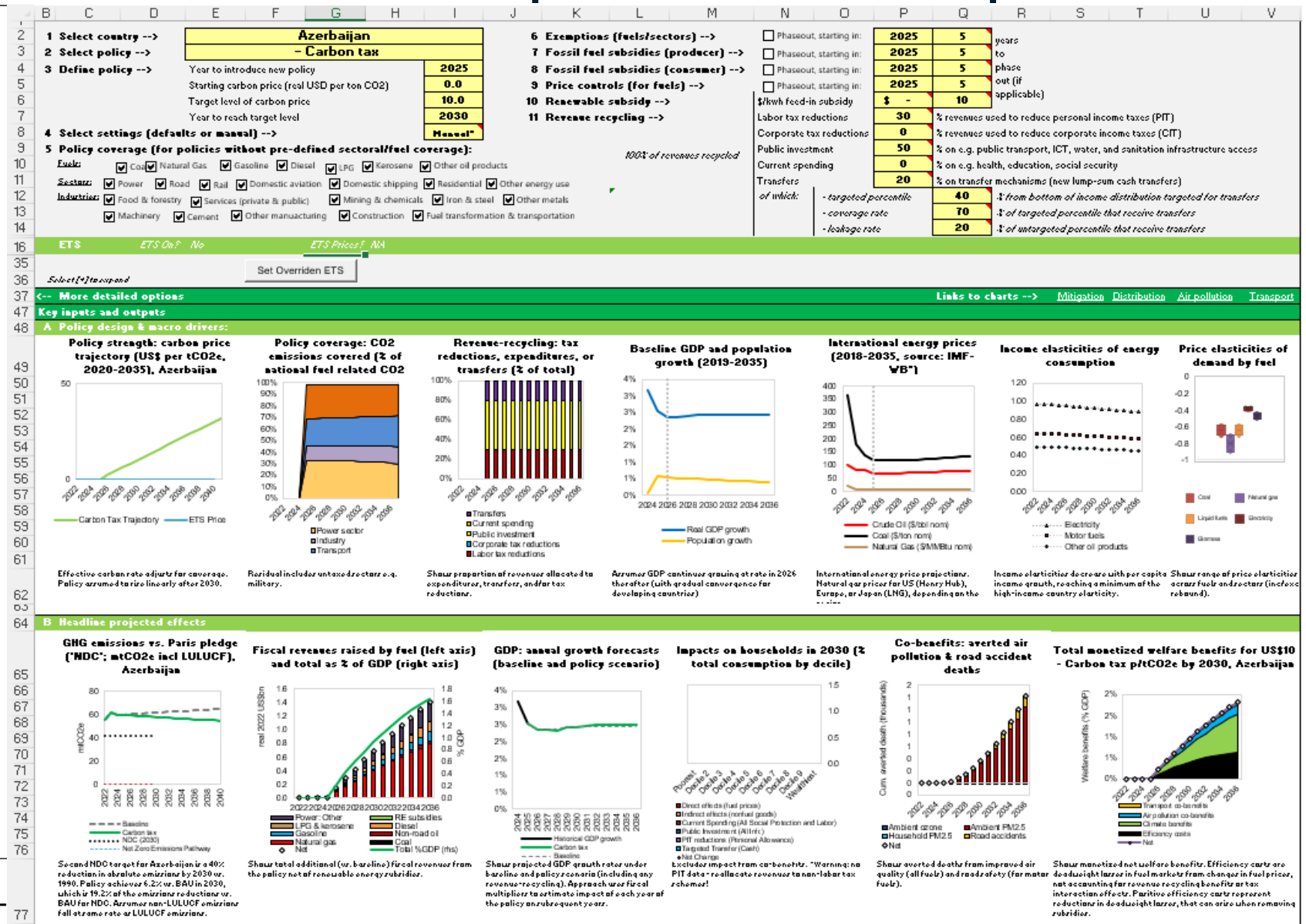
How does CPAT work?

CPAT Dashboard

Select fossil fuel subsidy reform (production & consumption), exemptions, and revenue use

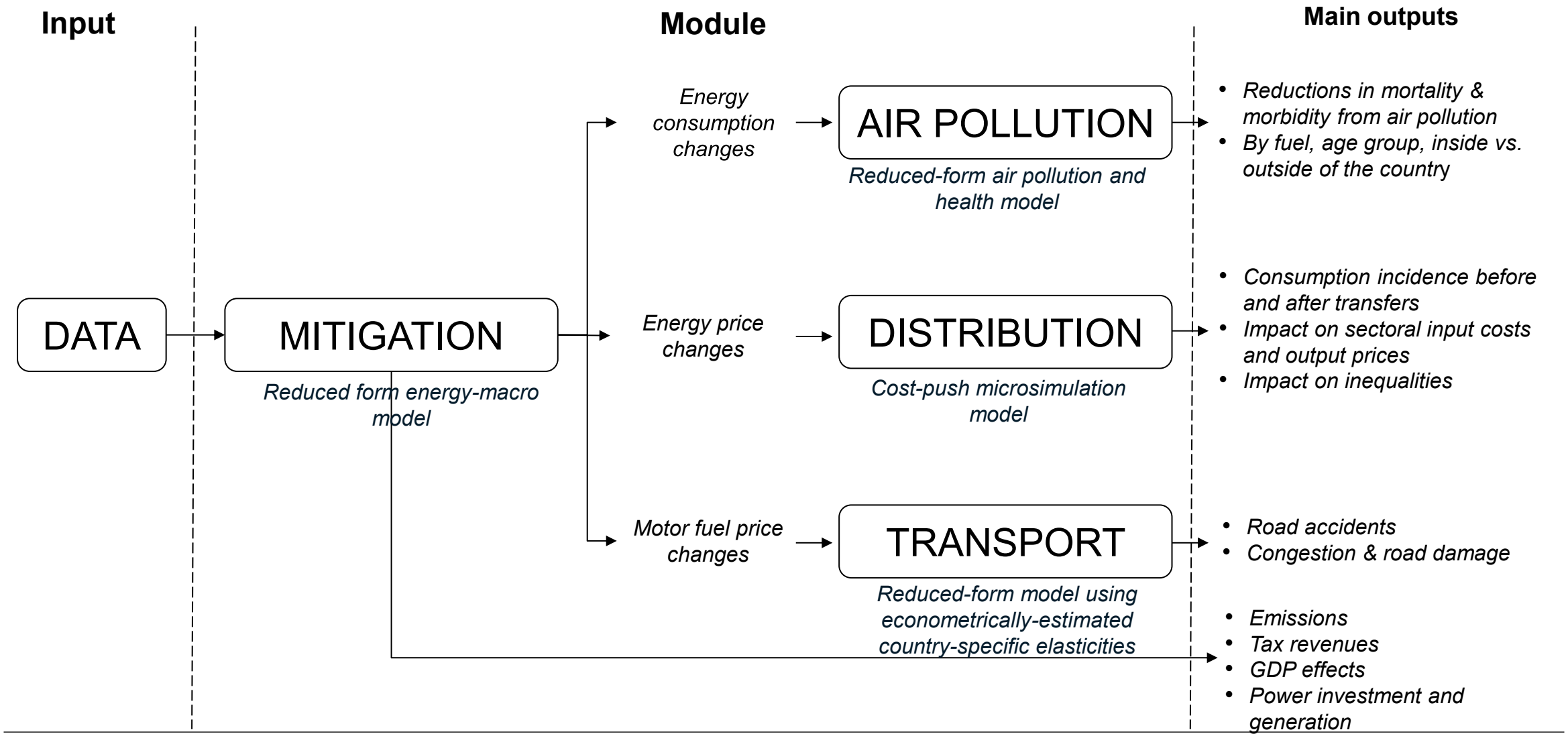
User designs policy (tax base and trajectory, expenditure, complementary policies, advanced assumptions…)

User sees effects in real-time (economic, energy, environmental, incidence, etc.)



CPAT was developed jointly by WB (Planet-

CPAT structure ('model of models') overview



Deep dive on carbon tax

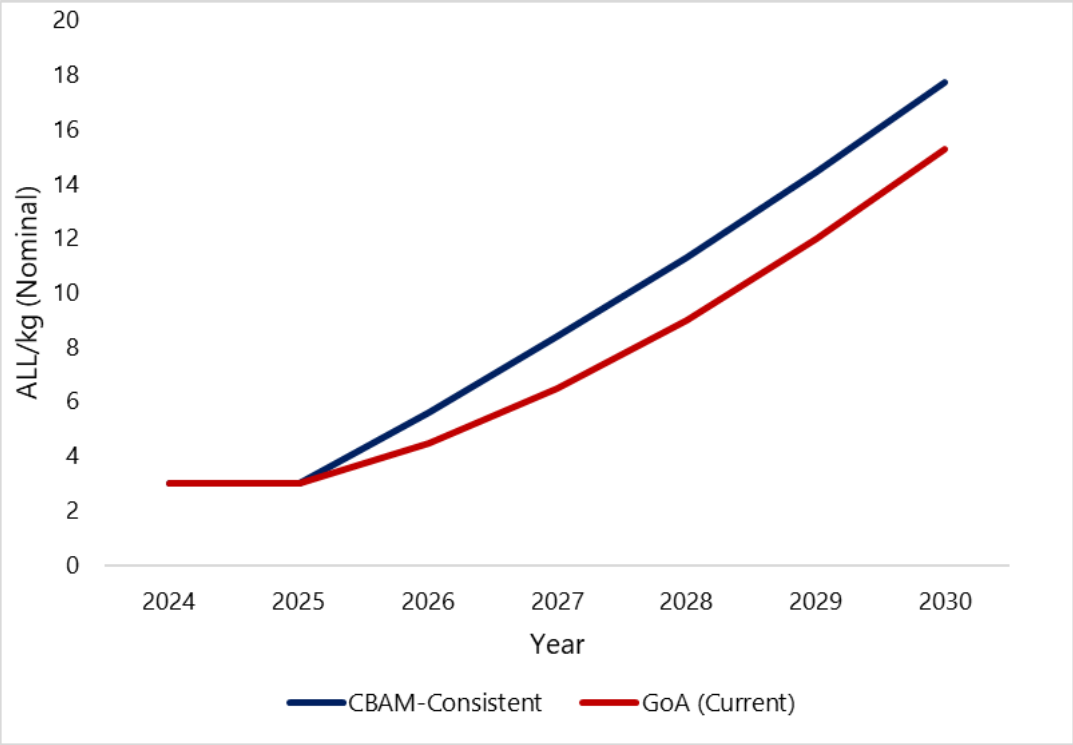
Impacts Modelled in CPAT

Rapid estimation of **multiple effects** of carbon pricing

- Energy & emissions
- Revenue and GDP impacts
- Distributional impacts
- Development co-benefits (Air Pollution & Transport -> better Health outcomes)

Country example: Albania

Albania: GoA vs. CBAM-Consistent Carbon Tax Trajectory, 2024-2030 (In nominal ALL/kg coal)



Source: WB staff estimates using CPAT.

CPAT was used to run an **impact assessment** in the context of the Public Finance Review and WB policy loan for the Government of Albania:

1. **GoA's current (at the time) strategy**
2. **A 'full' CBAM-consistent scenario** (proposed scenario)

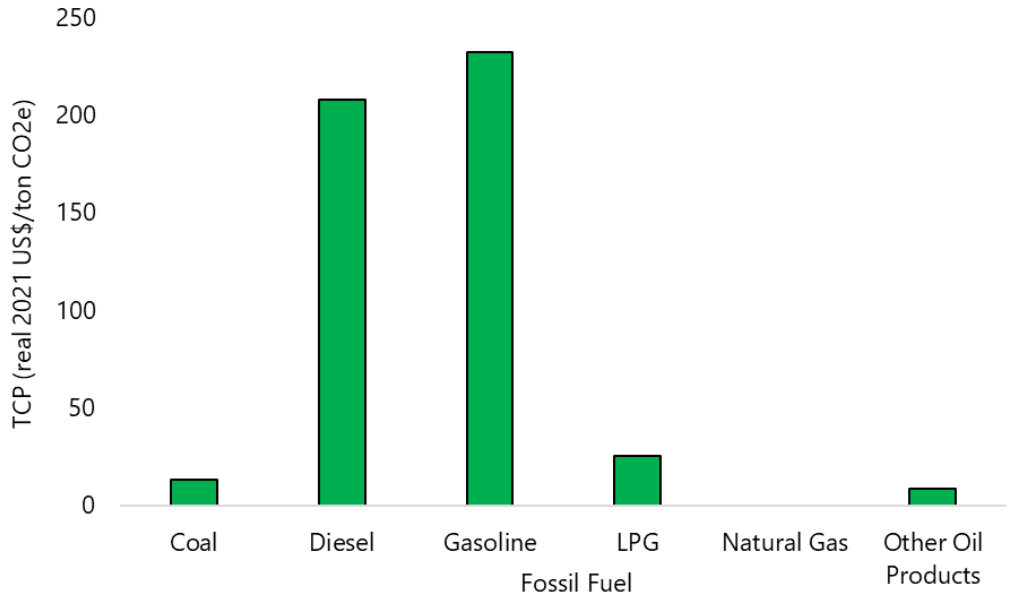
Policy outcome: The engagement led to a policy change → the carbon tax was accelerated to meet the schedule matching the price needed to fully capture CBAM revenues.

CPAT captures existing fuel taxes (and/or subsidies)

- CPAT consolidates any direct (carbon taxes, ETSs) or indirect (fuel excises, fossil fuel subsidies) policies levying a price on carbon content of given energy products

- Albania under-taxes coal/natural gas (e.g., relative to other fuels)

Albania: Total Carbon Price (TCP) by Fossil Fuel, 2023
(In real 2021 US$/ton CO2e)

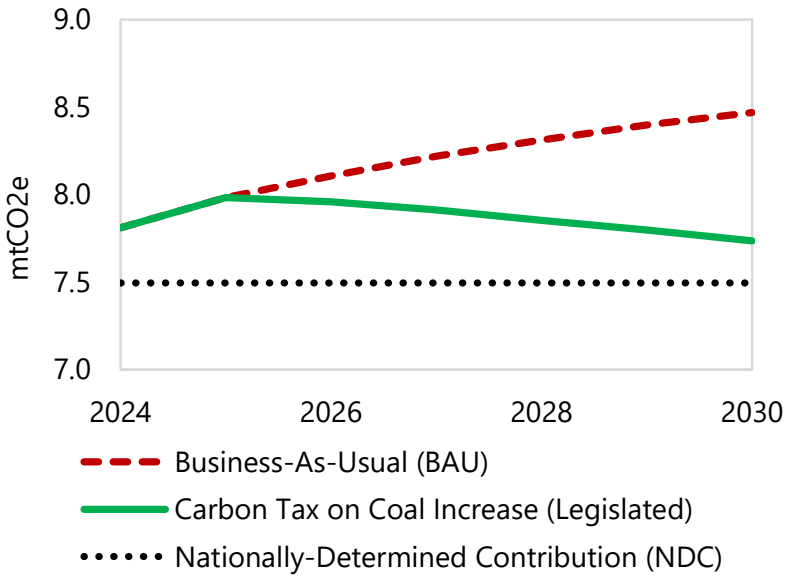


Source: WB staff estimates based on Agnolucci et al. (2024).

CPAT Produces Results on Emissions Reduction & Revenue Gains

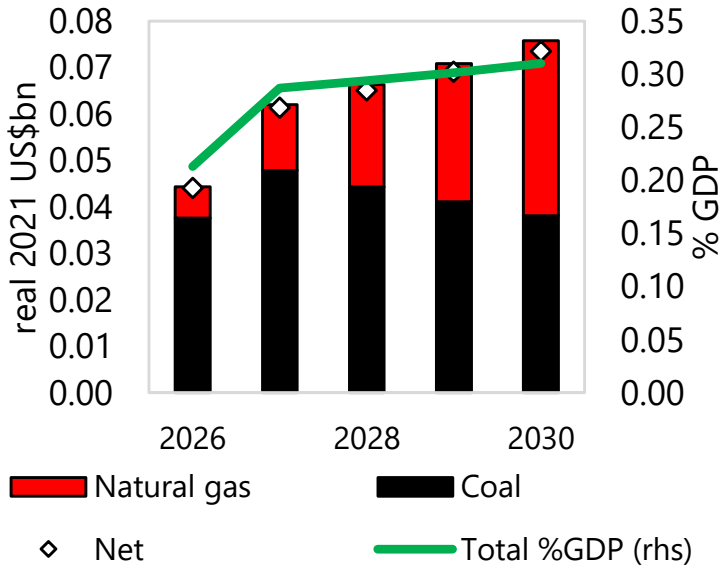
The output from CPAT included standard CPAT analysis of GHG reduction and of revenue gains.

Albania: Total Greenhouse Gas Emissions by Scenario, 2024-2030
(In millions of tons of CO2-equivalent)



Source: WB staff estimates using CPAT.

Albania: Revenue Gains from Carbon Tax Reform, 2026-2030
(In % of GDP and real 2021 US$ billions relative to BAU)

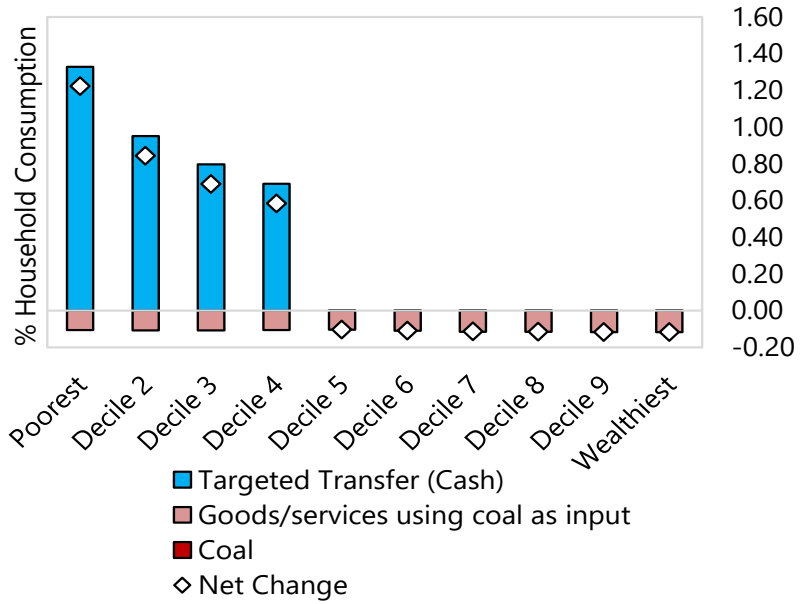


Source: WB staff estimates using CPAT.

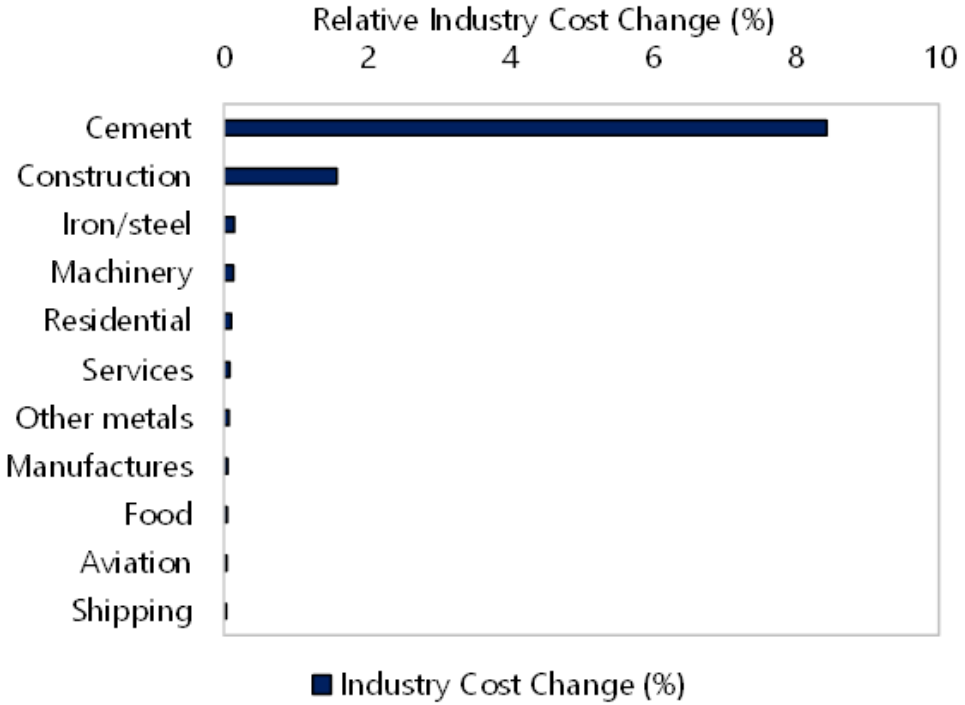
CPAT Produces Distributional and Industry Analysis

Distributional analyses includes impacts of revenue use. Covers both population (by income decile) & industry

Albania: Mean Household Consumption Incidence (With Revenue Recycling with per-capita transfers to bottom 40% of income distribution) for Carbon Tax Reform, 2030
(In % of household consumption by welfare decile relative to BAU)



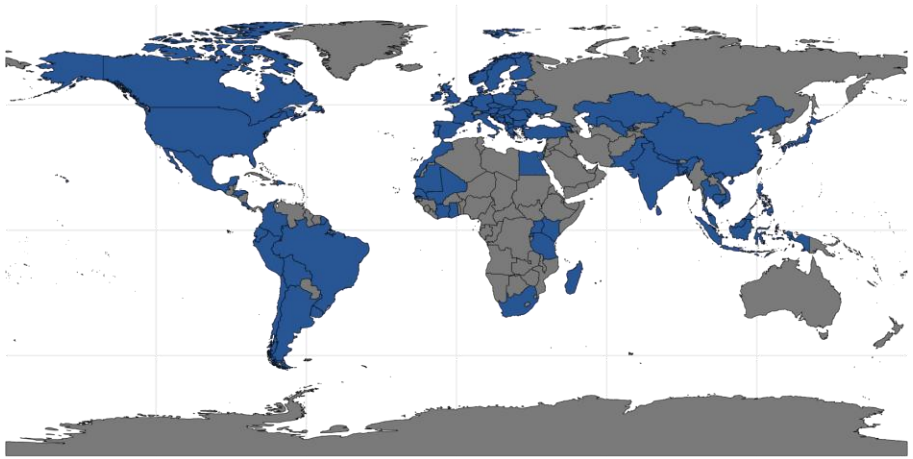
Albania: Carbon Tax Impact on Industry Costs by Sector from GoA Reform, 2030
(% change in input costs relative to BAU)

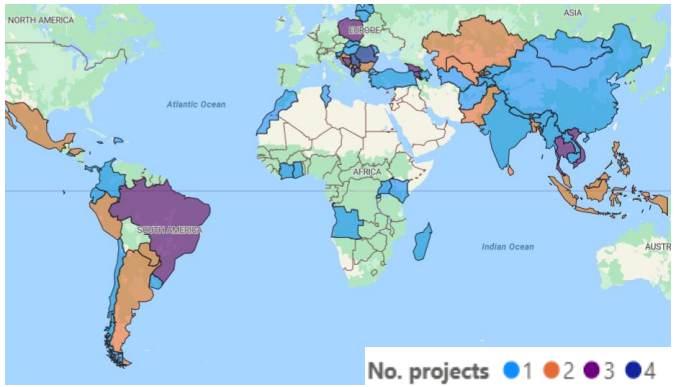


Source: WB staff estimates using CPAT.

CPAT Country Coverage and Examples of PMI Application

Covers around 190 countries





Projects Completed in 72+ countries

Distributional Data in 74+ countries

CPAT application in PMI countries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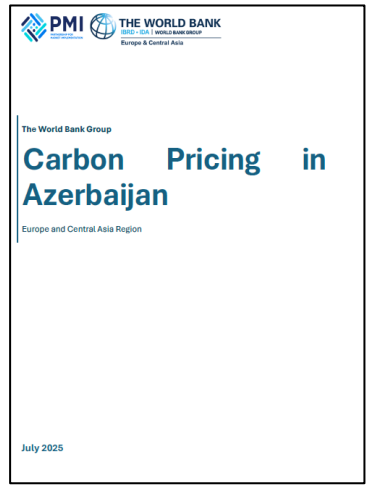
Évaluation de la conception et des impacts socio-économiques potentiels d'une taxe carbone au Sénégal

Rapport final
2 octobre 2024

Préparé par la Banque mondiale[1]

PMI CPAT Study in Senegal (2024)


PMI THE WORLD BANK
Europe & Central Asia

The World Bank Group

Carbon Pricing in Azerbaijan

Europe and Central Asia Region

July 2025

PMI CPAT Study in Azerbaijan (2025)

- **Ongoing impact assessment in Botswana**
- **Uzbekistan government has received a CPAT training (October 2025) and is using the tool**

Deep Dive on ETS

CPAT-ETS Task

Issues:

- **Gaps** in application of CPAT to emissions trading (see next slide).

Task Problem Statement:

- **Upgrade CPAT** to implement **ETS-specific features**.

Intended Outcome:

- **User-friendly ETS tool** for future **PMI country studies**.

Key Design Features

Upgrading CPAT to accommodate ETS-specific needs

Cap Setting

- **User can set ETS cap**, including **sectoral coverage**, and **derive emissions permit price.**

Permit Allocation

- Includes **auctioning** and **permit allocation options** and how this influences **revenue** and **effectiveness.**

Policy Interaction

- **New, simpler user interface** for **multiple policies**. **Interaction effects** modelled

Impact of Volatility

- Consider the impacts of **permit price volatility.**

How the Tool Works

- Uses **CPAT adjusted elasticities** plus **technoeconomic power-sector model**
- Has both goal-seek (5 min; preferred approach) and approximate-instant approach to determine **emissions permit price**.
- **Accounts for policy interaction effects,** permit **allocation** and **volatility**.

Methodological Notes

Allocation

Allocation Approach	Elasticities Impact	Effect on Prices and Revenues
Auctioning	Extensive Margin (demand); and Intensive Margin (efficiency/fuel switching/investment)	Full pass-through of prices
Output-Based Allocation	Intensive Margin (efficiency/fuel switching/investment)	As feebate, i.e. zero revenue impact, minimal effect on prices

Volatility

Based on Aldy and Armitage (2020) *The Cost-Effectiveness Implications of Carbon Price Certainty*

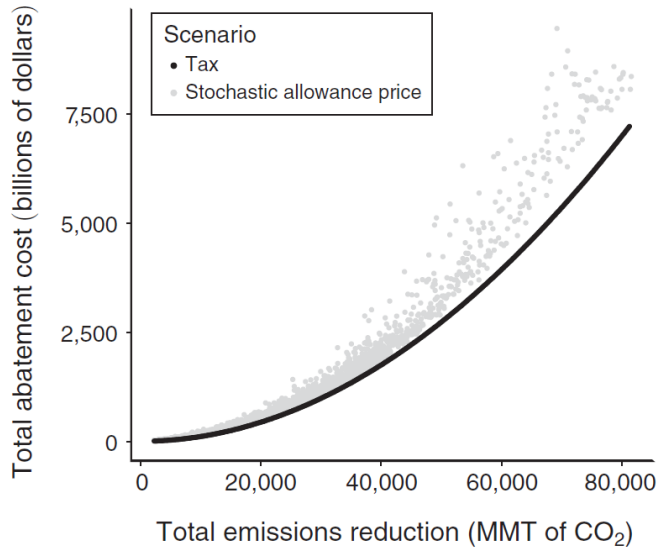
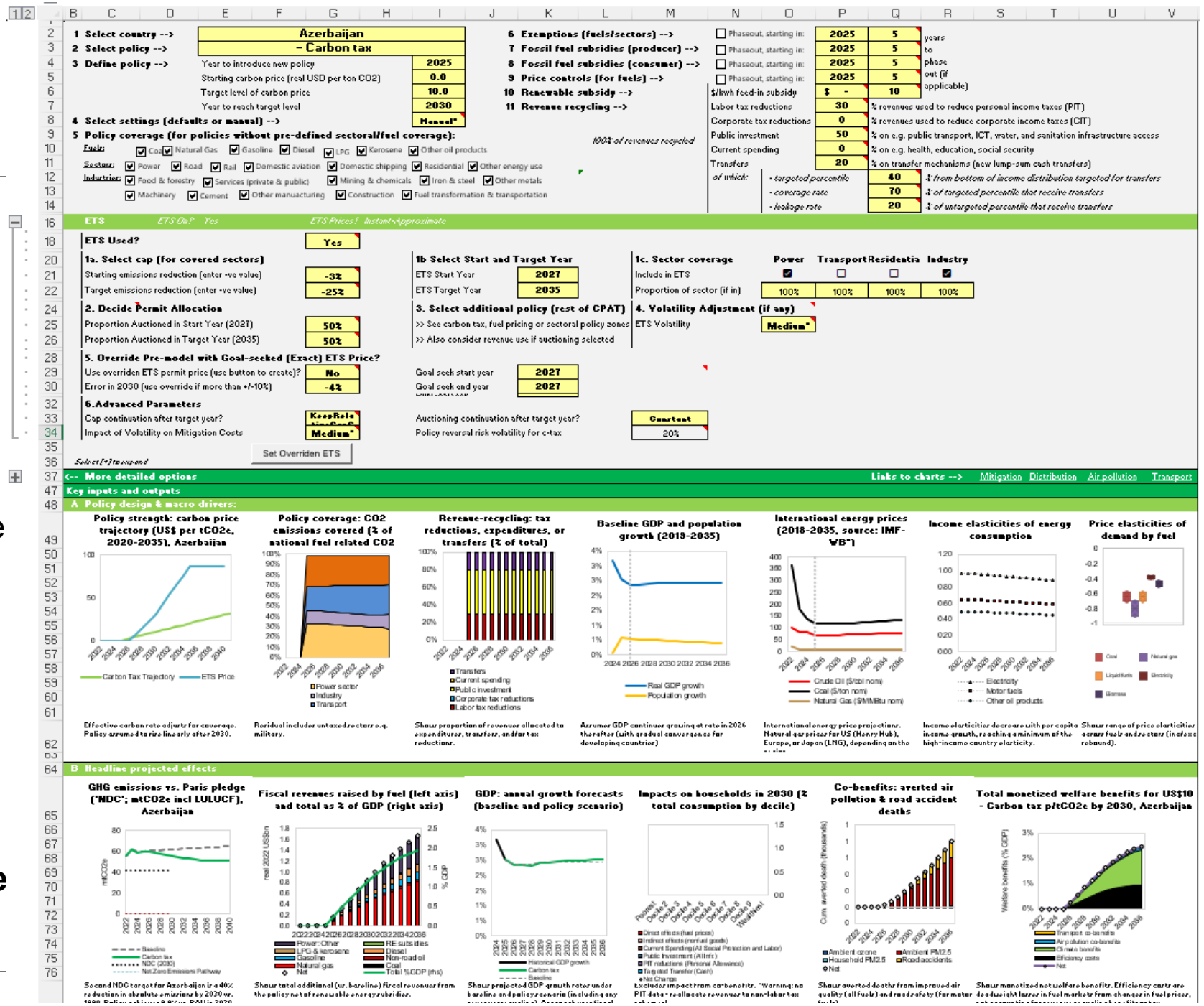


FIGURE 3. TOTAL EMISSIONS REDUCTION FROM TEN YEARS OF ABATEMENT INVESTMENT

User Interface

Key features

- **ETS fully implemented**
  - Cap setting
  - Permit allocation
  - Policy interaction
  - Volatility
- **Multiple policies** now selectable at once (expandable
  - Carbon tax
  - Fuel pricing
  - Sectoral policy
  - Revenue use
- **Simplified interface**
- Calculation tabs **hidden**
- **Data and graphs in one place** for main outcomes



Using the Tool

Demo

- **Basic Use of CPAT for Carbon Tax**
- **Basic Use of the ETS Tool**
  - Setting the cap
  - Setting the allocation process
  - Finding the permit price (two options)

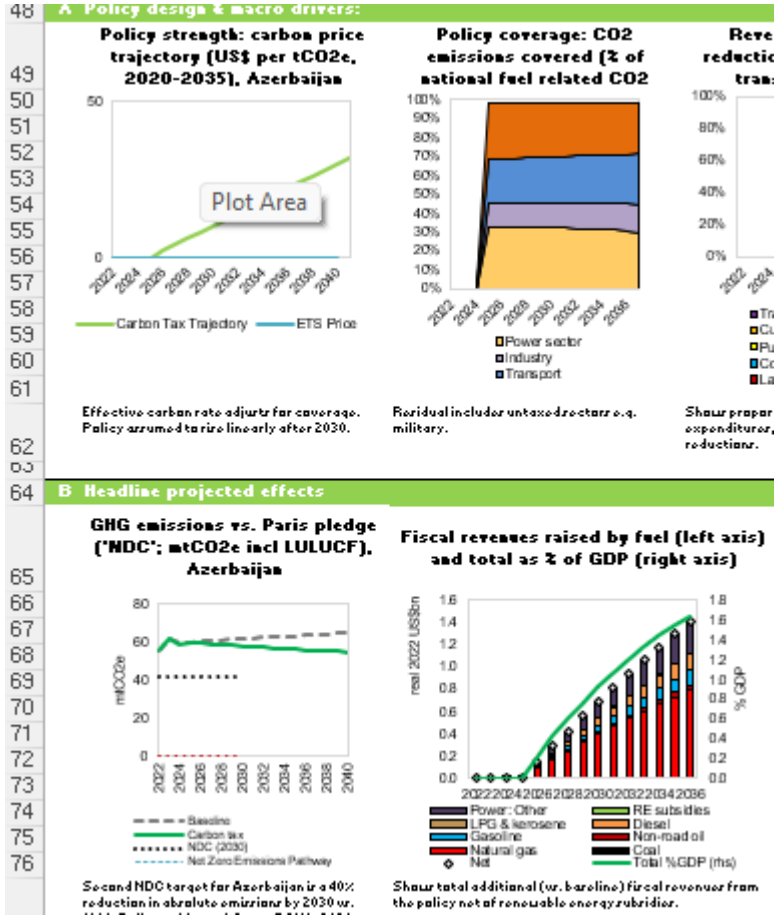
- **Policy Design and Interactions**
  - Carbon Tax, Subsidy Reform and Power Policies and Investment
  - Permit price includes interaction effects

Basic Use of CPAT

1 Select country -->	Azerbaijan	
2 Select policy -->	– Carbon tax	
3 Define policy -->	Year to introduce new policy	2025
	Starting carbon price (real USD per ton CO2)	0.0
	Target level of carbon price	10.0
	Year to reach target level	2030
4 Select settings (defaults or manual) -->		Manual*

Outputs

- Emissions
- Revenues
- GDP
- More…

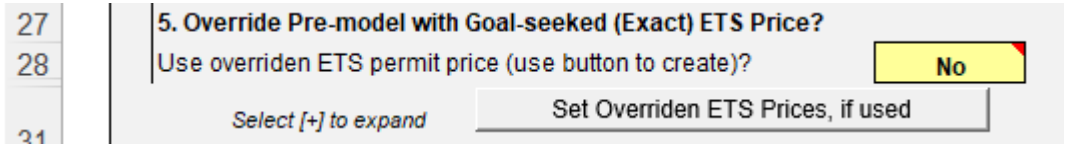


Inputs

- Setting Carbon tax, including exemptions
- Setting subsidy reform (not shown)

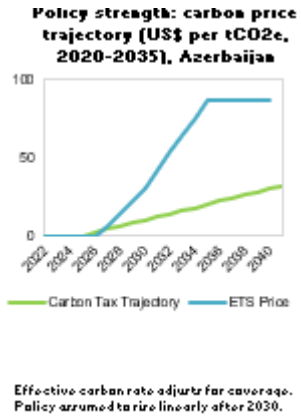
Basic Use of the Tool: Inputs

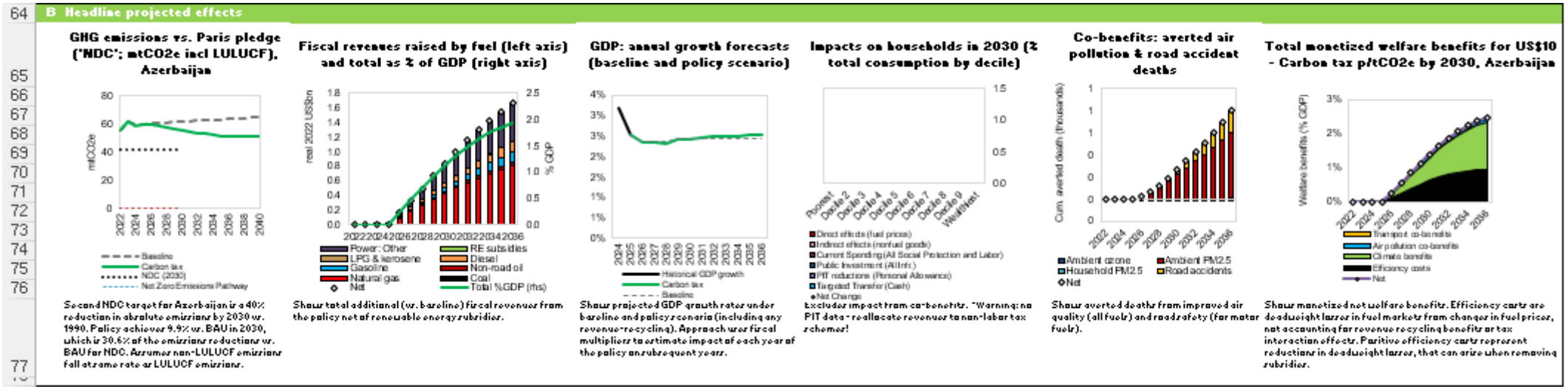
- Setting the cap
- Setting the allocation process
- Override quickly-generated ETS price (if needed)



Basic Use of the Tool: Outputs

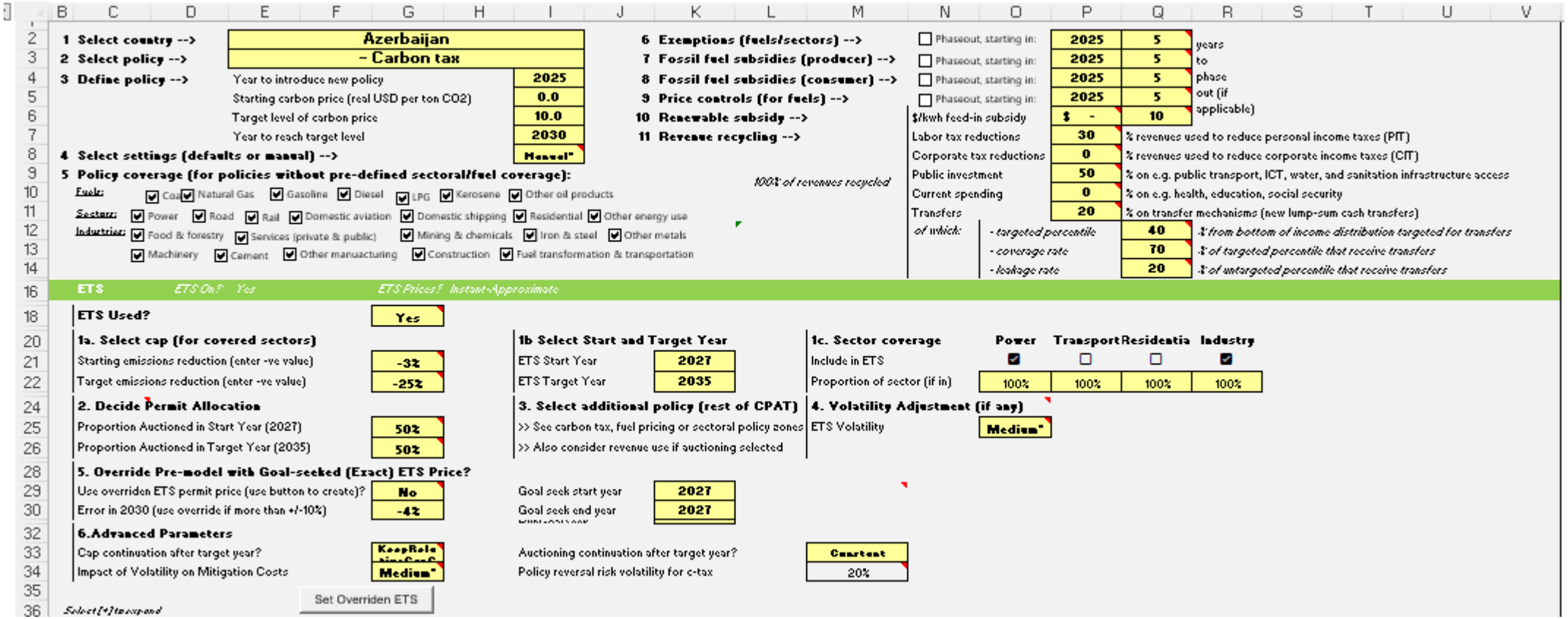
- Permit prices (panel 1)
- Emissions reduction, revenue, GDP (panel 2)





Policy Design and Interactions: Inputs

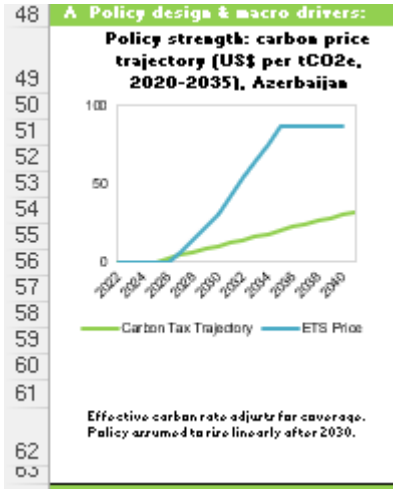
Carbon Tax, Subsidy Reform, and ETS together

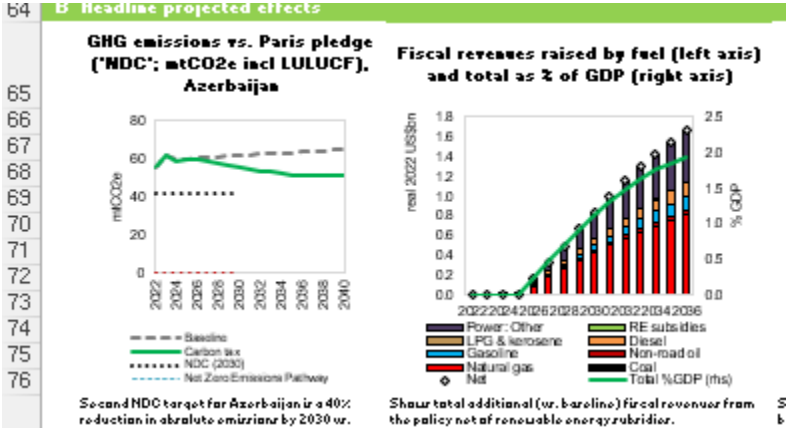


Policy Design and Interactions: outputs

Example (with policy interaction):

- GHG emissions still the same in covered sectors (waterbed effect)
- Emissions permit price lower
- Revenues different





Conclusions and Next Steps

Next Steps

Feedback on the CPAT-ETS tool	We **welcome feedback** on the tool, now or via email especially on **model refinements, usability, and country work**. Thank you!
Overcoming limitations of the tool as presented	There are some limitations e.g., in the treatment of **emissions permit allocation**, due to working in Excel & avoiding unwieldy complexity. Limitations to be resolved incrementally during integration and in WP.
Integration into IMF-WB CPAT Version	The CPAT-ETS tool has been **developed collaboratively** with **IMF review**; we intend to **integrate** it into IMF-WB CPAT.
Working Paper and Validation	The tool is at the **prototype stage** seeking **pilot** application. A short write up of the tool has been produced. We intend to develop this into a working paper (WP) with **validation** via **peer review**, **country work** and **back testing**.
Country Work	CPAT is a **dynamic tool** that **develops** in response to country engagements and feedback. We seek PMI country studies **from Jan 2026** to **apply** the tool, **validate** in country context and **make further refinements**.

ETS Tool Summary

Objectives & Design Features

Introduce **ETS modelling into CPAT with** key features:

1. **Determine ETS price from cap**
2. Different permit **allocation methods**
3. **Policy interactions** and layered policies.
4. Impact of price **volatility**

This should all be implemented in main **CPAT for countries' use – and therefore needs to be user friendly.**

Outcomes

A **new tool** is available with capability to model ETSs in CPAT, enhancing the coverage and sophistication of CPAT ETS modelling and with four key objectives (as stated left) complete. It includes:

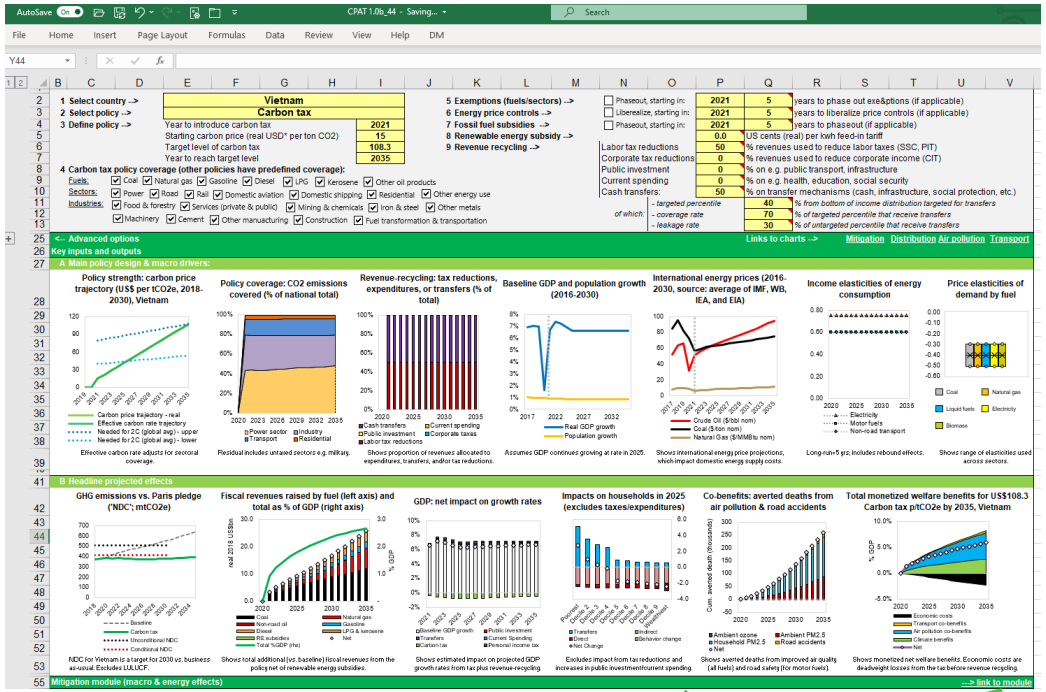
- New **simplified UI**
- Enhanced ability to **combine policies**
- Pre-model for immediate approach to determine **approximate permit price**
- **Macro taking 5 minutes** for full consistency and results for report

Next Steps

- The algorithm and UI will also be integrated into the **IMF-WB CPAT**.
- The tool can be applied in **country studies**
- **Enhancements** according to country demand and **testing/validation** planned
- A **working paper** will be produced in due course
- **Feedback** is welcome

CPAT Overall Summary

- Allows for **rapid estimation of effects of climate mitigation policies** carbon pricing and fossil fuel subsidy reform
- **Helps policymakers assess impacts and design, compare, and implement** policies to achieve their climate mitigation targets (Paris Agreement NDCs) and development goals (SDGs) jointly
- Now augmented with an **ETS module** which models **emissions reduction, permit allocation, permit price,** and **policy interaction.**
- **We continue to update the tool**
- **We are developing a coded (non-Excel) form of CPAT..**



CPAT
Climate Policy Assessment Tool

Thank you

External WB Website:
https://www.worldbank.org/en/topic/climatechange/brief/climate-policy-assessment-tool (or google “CPAT WB”)

Online documentation:
https://cpmodel.github.io/cpat_public/

To request CPAT, email: cpat@worldbank.org

To request CPAT, email: cpat@worldbank.org

Q&A

Extra slides

User Interface

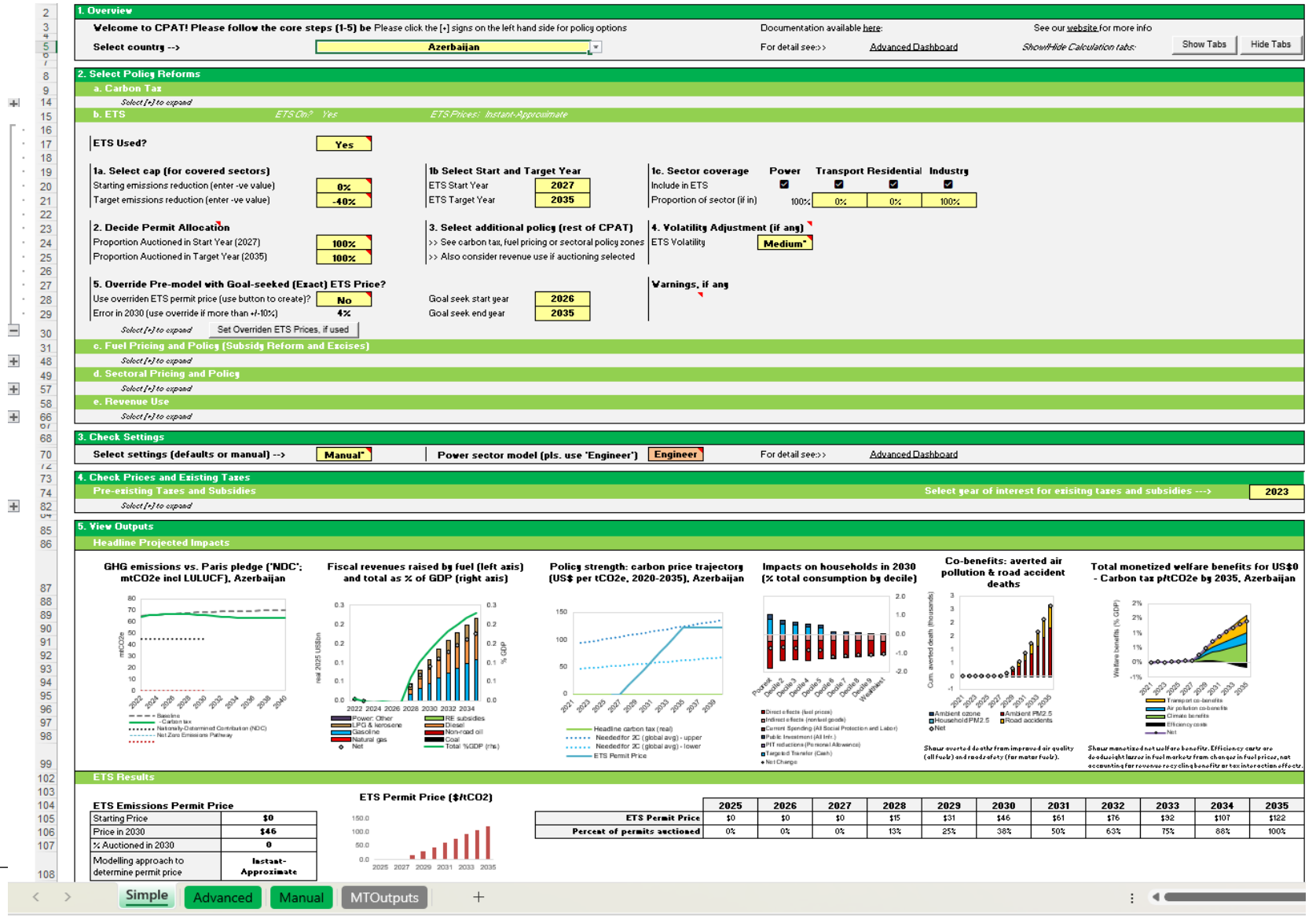
Key steps for overall UI

1. **Country selection**
2. **Policy inputs:**
   - ETS: cap, covered sectors, permit allocation
   - Other policies & revenue use

Expansion Buttons

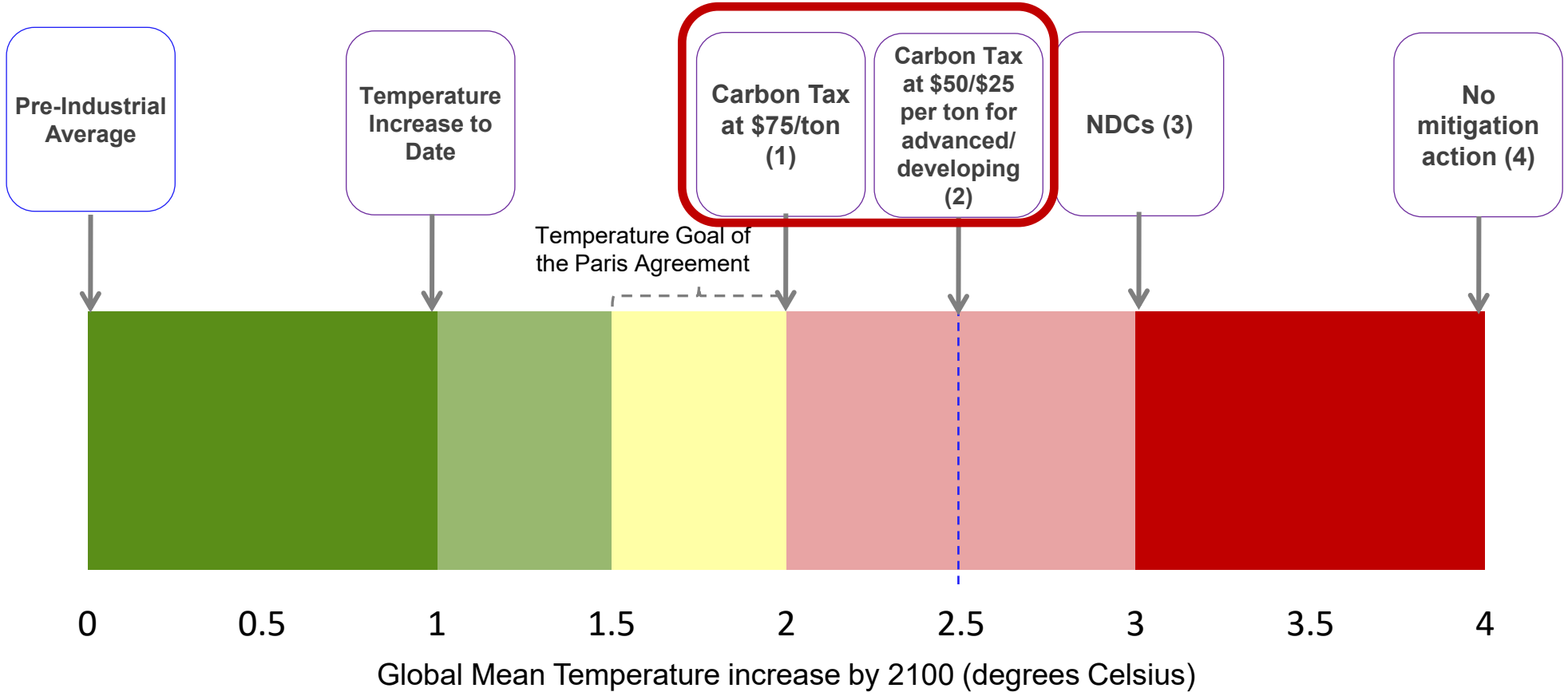
3. **Settings** (also see adv. panel)
4. Pre-existing fuel pricing/taxes
5. **Results**
   - Headline results panel
   - Detailed results panels

Other tabs (Adv., Manual, Output)



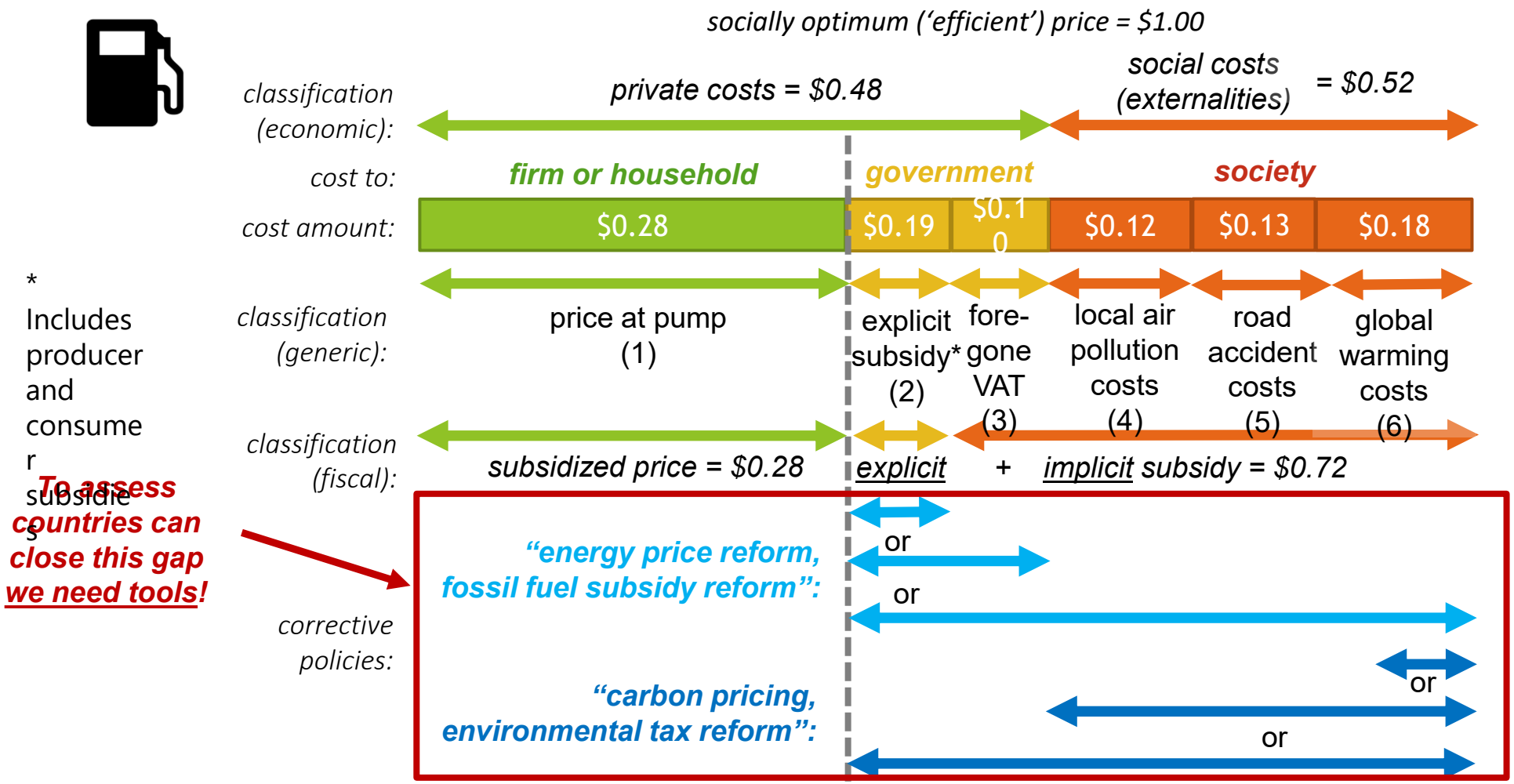
…which requires substantial carbon taxes

SNAPSHOT OF POLICIES IN 2030 CONSISTENT WITH WARMING PATHWAY

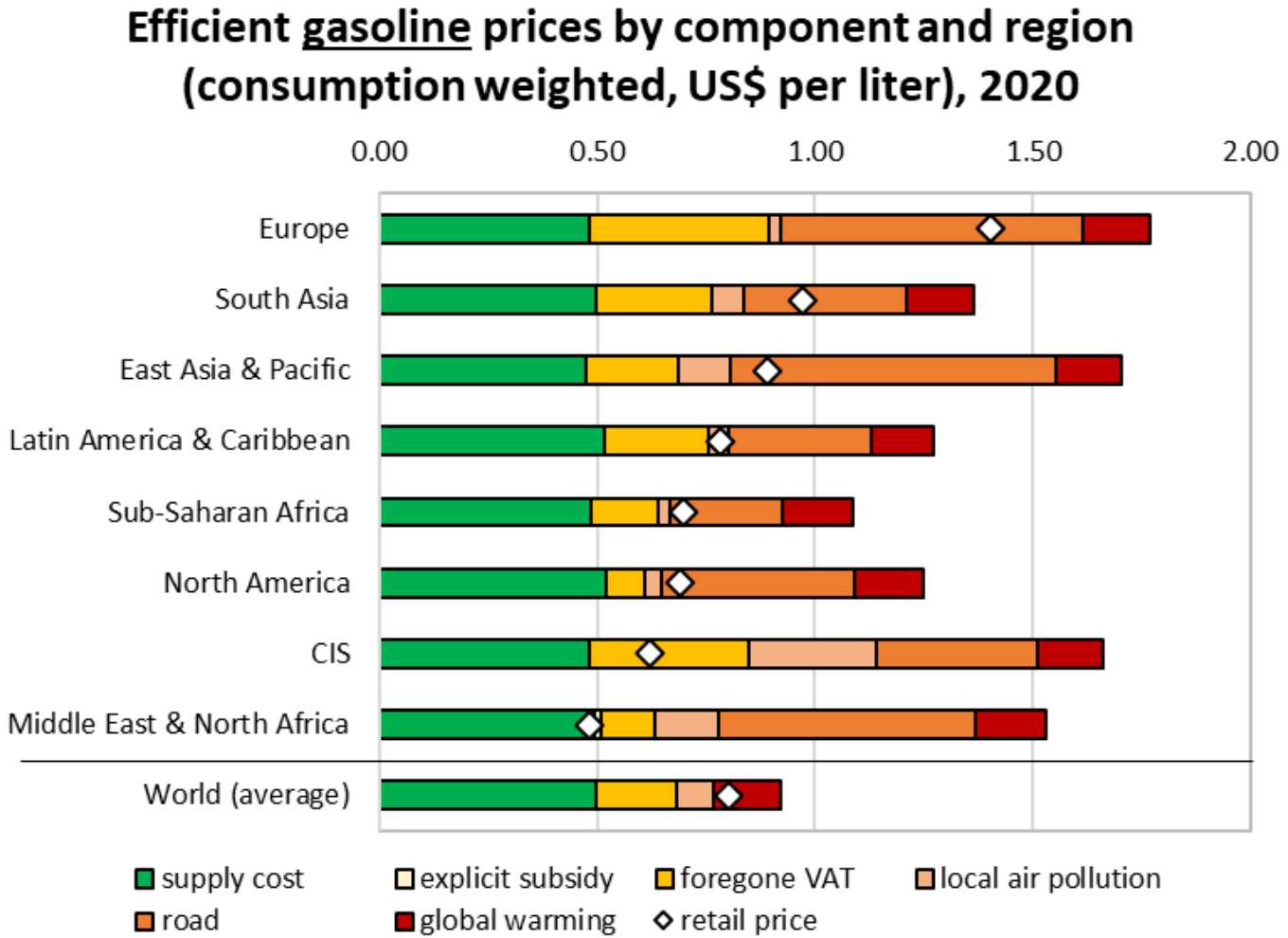


(1) Assumes the explicit carbon-price level of US$40–80/tCO2 by 2020 and US$50–100/tCO2 by 2030 (Stiglitz and Stern, 2017).
(2) IMF, Fiscal Monitor (October, 2019).
(3) UNEP (2018).
(4) Nordhaus (2018); and Intergovernmental Panel on Climate Change (2014).

The linked concepts of carbon pricing & fossil fuel subsidy reform



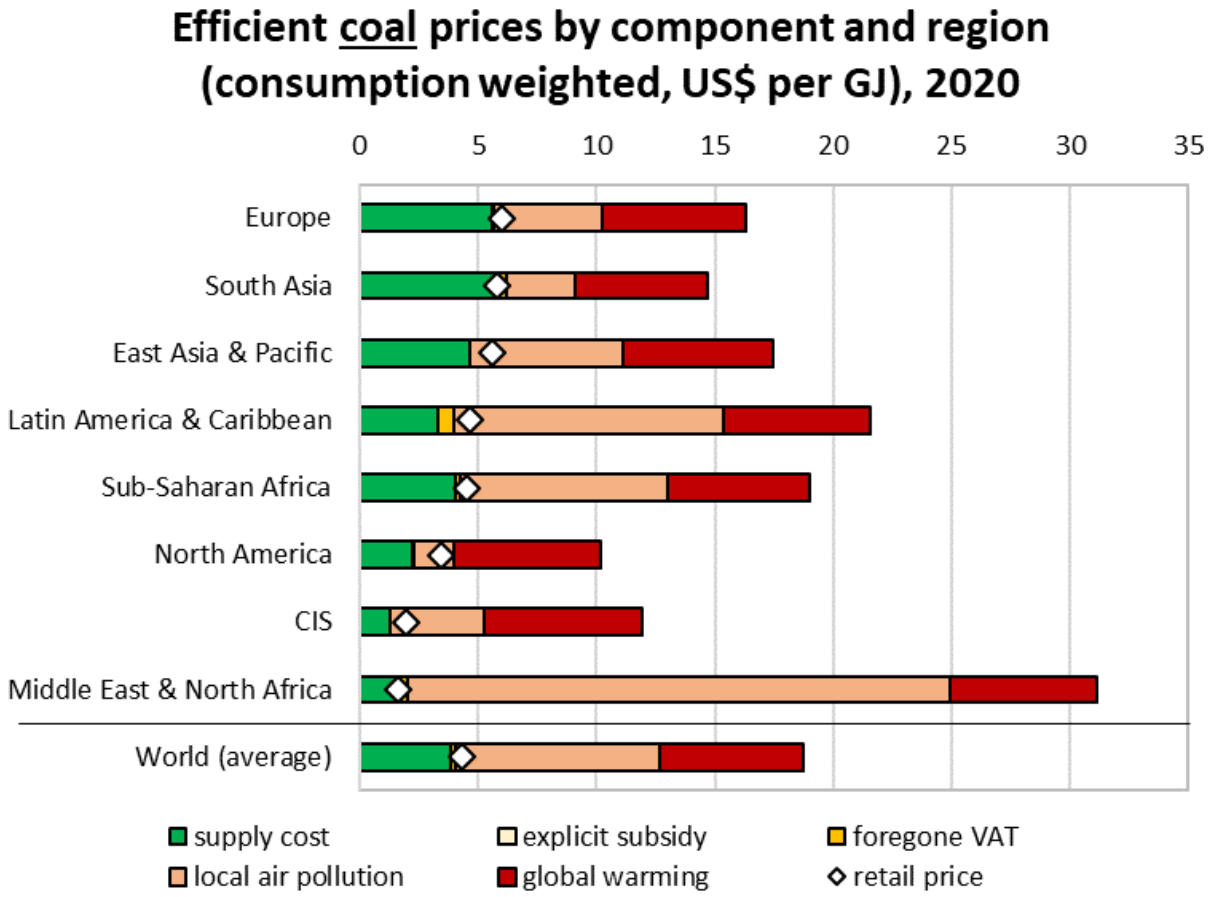
Energy price gaps persist across countries…



Source: IMF

…and are especially large for coal

CPAT can help understanding this gap and assess the impacts of different environmental tax policies

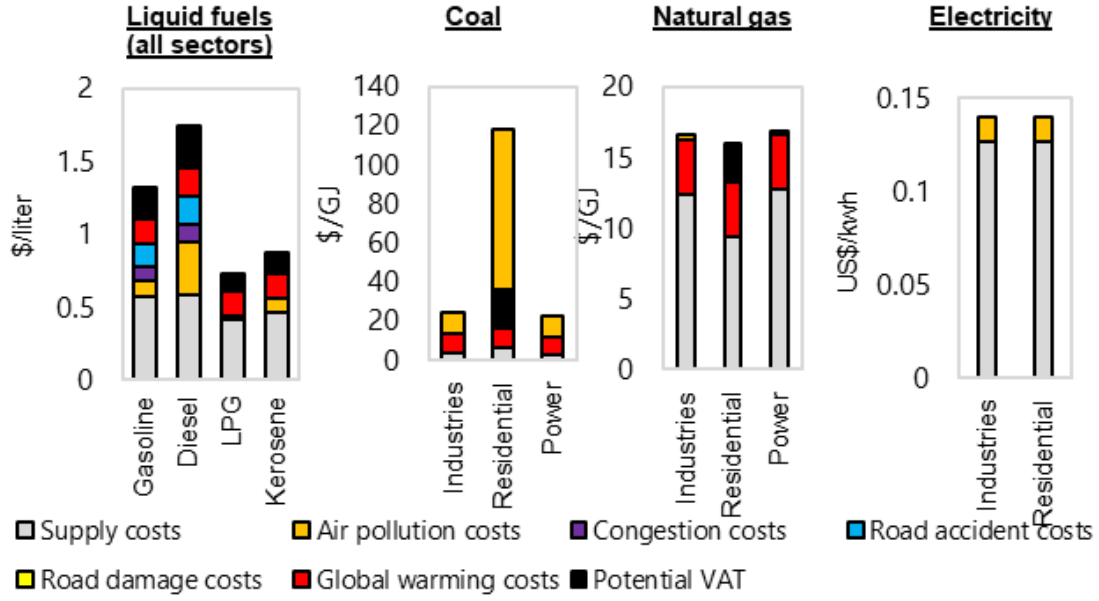


Source: IMF

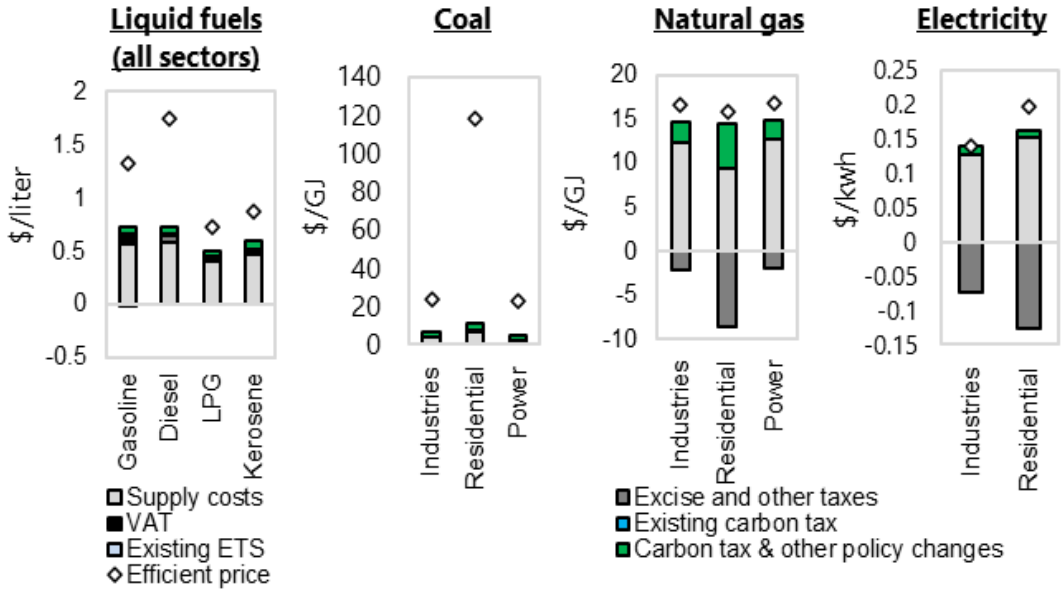
Valuing Externalities

Example: Uzbekistan, carbon tax starting in 2024 with 0 US$/tCO2e, increasing to US$25 in 2030 + phase out of fossil fuel subsidies

Energy externalities in the baseline: by fuel in 2030, Uzbekistan



Energy prices: projected and efficient in 2030, Uzbekistan



Global warming costs are based on the Report of the High-Level Commission on Carbon Prices. The level and growth trajectory can be changed in CPAT.