

# **7<sup>th</sup> Regional Exchange on Modelling for NECP**

## **Carbon Taxation**

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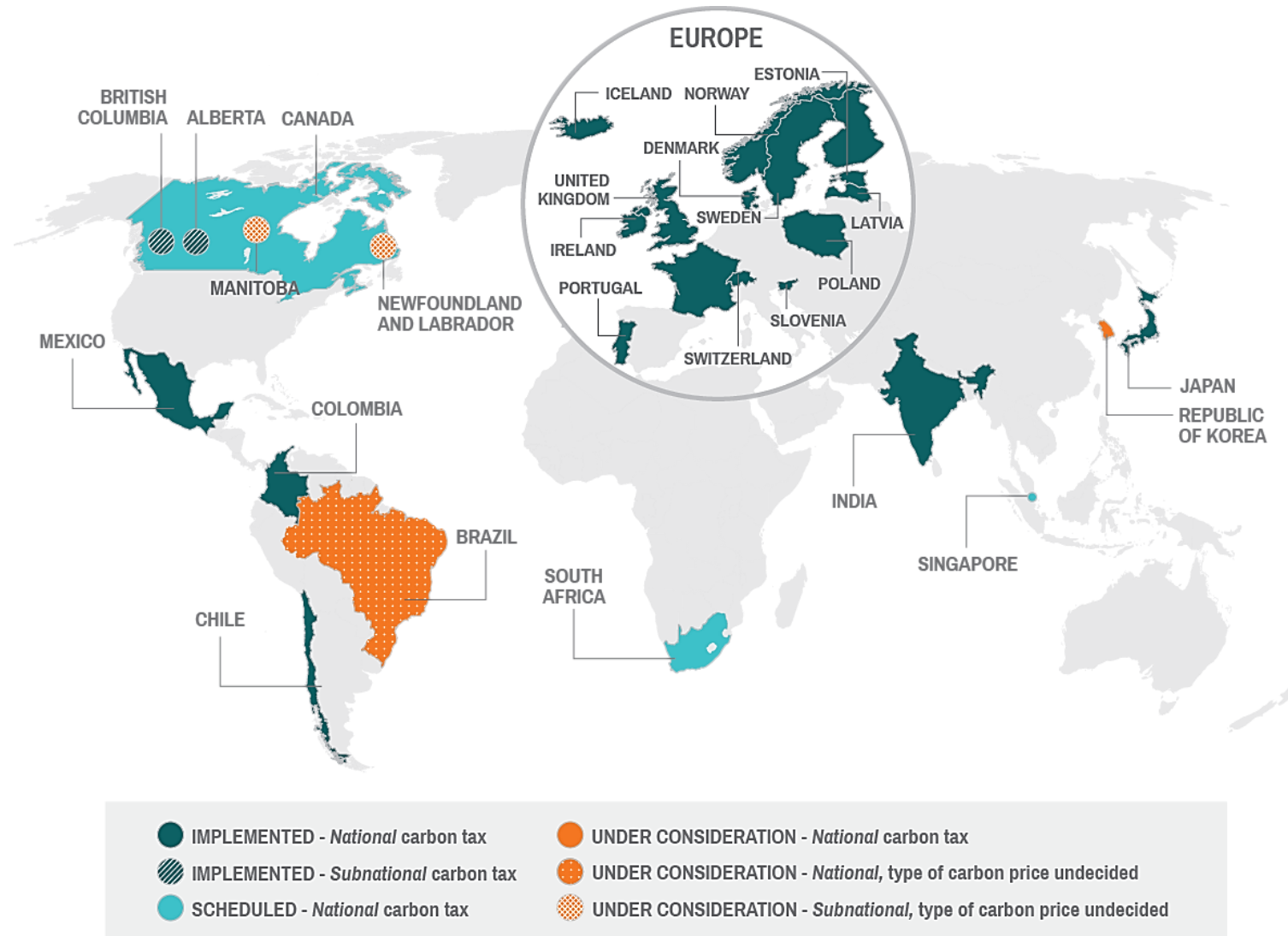
# What is a Carbon Tax?

*“A carbon tax is a tax that explicitly states a price on greenhouse gas emissions or that uses a metric directly based on carbon (that is, price per tCO<sub>2</sub>e).”*

(Source: World Bank, Carbon Tax Guide: A Handbook for Policy Makers)

- Carbon taxes are one of two main carbon pricing instruments. The other instrument is emissions trading.

# Carbon Taxes Around the World



# Carbon Taxes: Theory

- By explicitly putting a price on carbon, carbon taxes induce polluters to internalize the full social cost of pollution.
- Consumers and taxpayers therefore have a financial incentive to reduce their emissions in order to lower their tax obligation.
- Carbon taxes provide certainty over the price of emissions, but not over the quantity of emissions abated.

# Deciding on Whether to Adopt a Carbon Tax

- **Carbon taxes are suitable instruments when:**
  - Polluters do not have enough incentives to abate their emissions.
  - There are no or not enough technical mitigation options.
  - Investors need a stable and long-term price signal.
  - A jurisdiction wishes to raise revenues, and certainty over revenues is more important than certainty over emissions reductions.
  - A jurisdiction has limited capacity for implementation, or intends to introduce a carbon pricing instrument rapidly.
- **However, their suitability depends on the context in which they operate:**
  - Carbon taxes are most effective in market-driven economies.
  - They may need to be complemented by other policies, for instance, to encourage technology development.
  - The policy mix in which a carbon tax is introduced matters.

# Preparing the Adoption of a Carbon Tax

- Choosing the main policy objectives and understanding national circumstances is a necessary step to guide the design of the tax.
- **Policy objectives can include** revenue raising, fiscal efficiency, greenhouse gas emissions mitigation, low-carbon development, or any combination thereof.
- **National circumstances matter:** what is the emissions profile (of the jurisdiction and of key emitting sectors), what is the structure of the economy, which policy would stakeholders support, what are relevant government capacities?
- Economic modelling can help in the design process (see next slide).

# Modelling Carbon Taxes

- Models are a valuable tool to support public policy decision making.
- They can be used to:
  - Assess the impacts of alternative tax designs
  - Evaluate the impacts of different tax rate decisions
  - Compare carbon taxes to other instruments
  - Model the effects of different options for revenue use
  - Analyze impacts ex-post
- Models also have limitations, and as such they should be used to provide guidance, but not as the sole basis for decision-making.

# Defining the Carbon Tax Base (1)

- **Defining the tax base** – essentially the scope, or coverage, of the tax – is one of the first crucial steps in the design of a carbon tax.
- The tax base of a carbon tax refers to the sectors, entities, activities and/or products that are covered by the tax, i.e., required to pay.
- **Choosing a tax base has implications for:**
  - The amount of emissions reductions
  - The revenues raised
  - What stakeholders will be affected



# Defining the Carbon Tax Base (2)

- A distinction can be drawn between upstream/midstream taxes on the production, sale and import of fossil fuels, and taxes on direct emissions.
- **Taxes on fossil fuels** are relatively straightforward to implement, as they can make use of the existing tax system for applying excise taxes.
- **Taxes on direct emissions** require more oversight (MRV) and administrative capacity, but they can target a broader scope of emissions within a jurisdiction (e.g., in the transport or building sector).

# Determining the Carbon Tax Rate

- There are three main approaches to setting a carbon tax rate, depending on the main objective for the introduction of the policy.
- The **abatement target approach** is used when the main goal of a carbon tax is to abate emissions up to a determined level. This approach is based on marginal abatement cost curves, and therefore depends on the availability of reliable information.
- When the main goal is to raise revenue from the carbon tax, the **revenue target approach** can be taken, whereby the tax is specifically set to achieve a certain level of revenue.
- The **social cost of carbon** approach is used when jurisdictions intend to reduce emissions up to a level that reflects the economically efficient use of resources. The carbon tax rate is set equal to the social cost of carbon.

# Determining Use of Revenue (1)

- Carbon taxes can generate significant amounts of revenues. Policymakers should carefully assess how to use these revenues, as this decision will have implications for the overall economy, public welfare, and the efficiency of the tax system, as well as political support.
- **Revenue neutrality**: the overall budget remains unchanged by the carbon tax. Normally, this is achieved by either:
  - redistributing taxes back to households and businesses (**rebates**). An example of rebates for businesses are output-based rebates used to address carbon leakage, or equal per-capita rebates to address concerns about regressive distributional impacts of the carbon tax.
  - **reducing other taxes**, such as labour taxes.

# Determining Use of Revenue (2)

- **Increased spending**: the additional revenue collected is used to pursue public policies, often climate-related
- Appropriating revenue instead of recycling it to taxpayers can benefit:
  - The general budget
  - Earmarks
  - Debt reduction
- **Forgoing revenue by allowing offsets** can help reduce compliance costs by liable entities, but leads to reduced revenues and possibly less emissions reductions in covered sectors.

# Ensuring Oversight and Compliance

- Carbon taxes are relatively easy to administer, as they can make use of the existing taxation framework within jurisdictions.
- The choices made in the design of a carbon tax impact the institutional capacities needed for its oversight:
  - A carbon tax on direct emissions will require a robust monitoring, verification and reporting system.
- Compliance levels can be increased by imposing penalties and designing simple and transparent taxes.

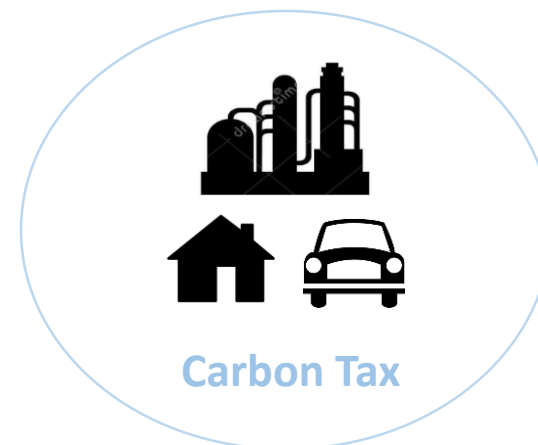
# Managing Overlap of Pricing Systems (I)



**Sectors:** Power, Industry  
**Unit:** \$/t CO<sub>2e</sub>



**Power**  
**\$/MWh**



**Fossil Fuels**  
**\$/l or ton**

# Managing Overlap of Pricing Systems (II)

| Coverage and Timing          |                               |
|------------------------------|-------------------------------|
| Synchronous/<br>Symmetrical  | Asynchronous/<br>Symmetrical  |
| Synchronous/<br>Asymmetrical | Asynchronous/<br>Asymmetrical |

# Managing Overlap of Pricing Systems (III)

| Coverage/<br>Timing | Synchronous                           | Asynchronous       |
|---------------------|---------------------------------------|--------------------|
| <b>Symmetrical</b>  | Price Floor<br>Coordinated<br>Overlap | Phase-In           |
| <b>Asymmetrical</b> | Compliance<br>Alternative<br>Opt-In   | No<br>Coordination |



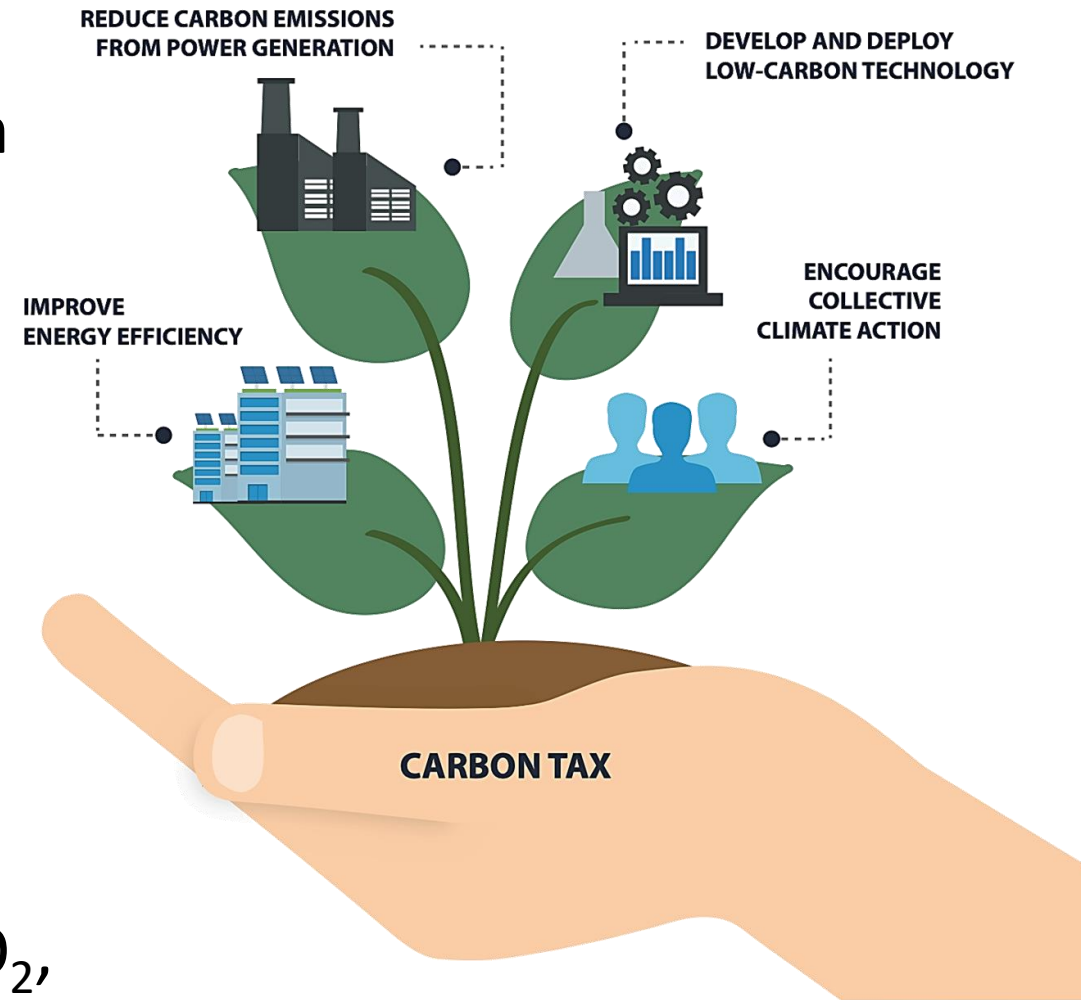
# Carbon Taxation in Practice: British Columbia

- The carbon tax in British Columbia was introduced as part of broader fiscal reforms. The rationale behind its introduction was reducing consumption of fossil fuels.
- The government used a revenue-neutral approach: the revenues raised were redirected to businesses and citizens through tax cuts and rebates (such as the Climate Action Tax Credit).
- By actively communicating this outcome, the government was able to reduce corporate and personal income taxes, securing widespread support and ensuring the political durability of the carbon tax.

# Singapore's Carbon Tax

- After more than a decade of consideration and preparation, Singapore launched a **carbon tax** in 2019.
- The tax applies to direct emissions of facilities that emit 25,000 tCO<sub>2</sub>e or more annually (30 to 40 companies).
- From 2019 to 2023, the tax rate is **S\$5 per tCO<sub>2</sub>e**, and it will increase to S\$10–S\$15 per tCO<sub>2</sub>e in 2023 after a review.
- The tax covers the following emissions: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>.

# SINGAPORE'S CLIMATE ACTION PLAN



# Further Resources

- Haites, Erik et al., “[Experience with Carbon Taxes and Greenhouse Gas Emissions Trading Systems.](#)” *Duke Environmental Law & Policy Forum*, Vol. 29: 109-182
- High-Level Commission on Carbon Prices. 2017. [Report of the High-Level Commission on Carbon Prices.](#) Washington, DC: World Bank
- International Monetary Fund (IMF). 2019. [Fiscal Monitor: How to Mitigate Climate Change.](#) Washington, DC: IMF
- Partnership for Market Readiness (PMR). 2017. [Carbon Tax Guide: A Handbook for Policy Makers.](#) Washington, DC: World Bank
- World Bank. 2020. [State and Trends of Carbon Pricing 2020.](#) Washington, DC: World Bank

**Thank you!**