Topic 9: Economics of Climate Change – Mitigation and Adaptation Policies

How to use economic perspectives to frame the discussions about the costs and benefits of climate change policy. Should we invest in a 'planet insurance'?

- Investments to protect human and health from risks of climate outcomes (such as reduced agriculture yields, floods, storms, heat waves and tropical diseases)
- Societies need to invest today to help reduce future risks and damages

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change. IPCC provide policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation options. The IPCC currently has 195 members.

In the latest IPCC report (2021), it finds that unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach. This is not just about the temperature, but climate change will bring multiple changes that increases risks and damages in different regions:

- Intensifying the water cycle - brings more **intense rainfall and associated flooding**, as well as more intense drought in many regions.
- Affecting rainfall patterns – **changes to monsoon precipitation**
- Rising sea level at coastal areas - contributes to **more frequent and severe coastal flooding** in low-lying areas and coastal erosion. Extreme sea level events that previously occurred once in 100 years could happen every year by the end of this century.
- Further warming - amplify **loss of seasonal snow cover, melting of glaciers** and ice sheets, and loss of summer Arctic sea ice.
- Changes to the ocean - more **frequent marine heatwaves**, ocean acidification, and reduced oxygen levels that affect human.
- For cities - **heat** (since urban areas are usually warmer than their surroundings), **flooding** from heavy precipitation events and sea level rise in coastal cities.

Source: IPCC (2021)

We need planet insurance!!!!
The question is rather 'How to make a cost-effective investment in planet insurance?'

Good climate policies should consider alternative risk-reduction strategies – mitigation, adaptation and insurance.
Recall:

- Mitigation policies = efforts to moderate the temperature rise by using strategies designed to reduce emissions or increase the planet's natural capacity to absorb greenhouse gases.
- Adaptation policies = efforts to modify natural or human systems in order to minimize harm from climate change impacts.

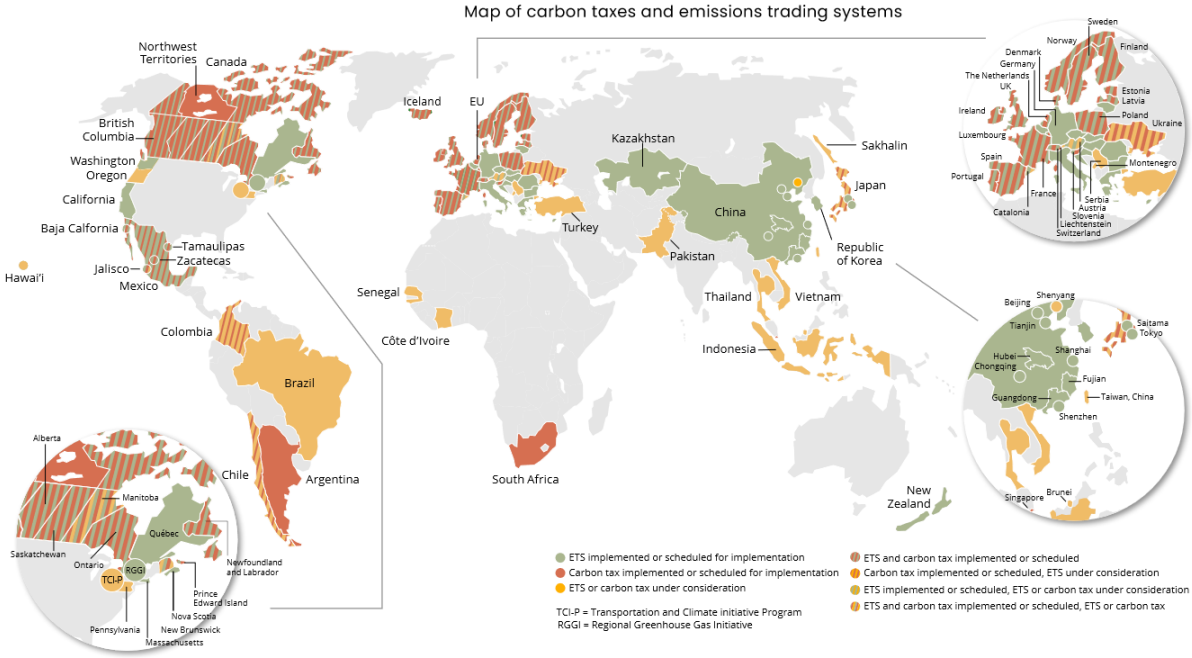
1. Mitigation policies

- Investments to reduce the probability of damages due to carbon emissions
- A public goods determined by the sum of all nations' efforts to reduce carbon
- A public risk-reduction strategy in which the benefits of reduced risk accrued to all nations

Mitigation policies try to address the underlying problem of increasing emission levels by slowing or stopping the rise in fossil fuel emissions. This includes how to incentivize the use of clean technologies to produce electricity and power vehicles and make the use of fossil fuels less economically advantageous. Good international climate policy should address the implementation of cost-effective risk-reduction policies – **Carbon Pricing Policies such as carbon taxes and emission trading systems.**

Why do we need to put a price on carbon?
As the world is still dependent on the use of fossil fuels, the use of fossil fuel created a number of jobs and is important to economic development. It has also enjoyed a subsidy in some countries while they do not need to pay for environmental damages (market failure in capturing external social costs of fossil fuel use). Carbon pricing policies are used to correct this failure by internalizing the social cost of carbon into fossil fuel prices.

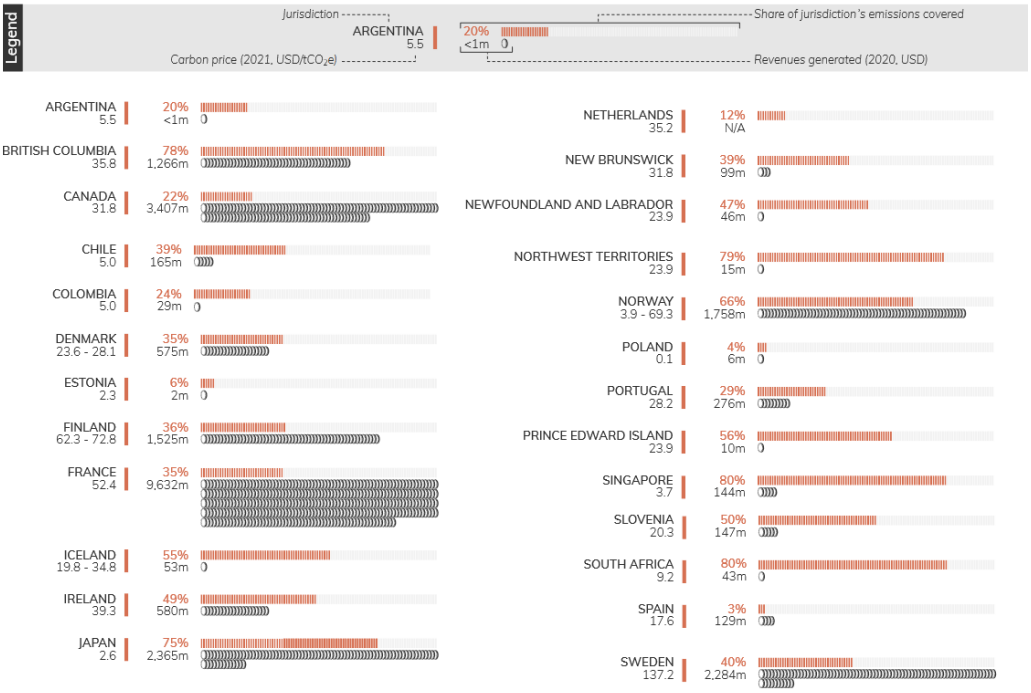
"When a power company is deciding between investing in a new wind farm or a coal-fired power plant, the decision should take into account the cost of pollution on top of the costs of both technologies."



Source: State and Trends of Carbon Pricing (2021)

Carbon tax:
Carbon tax sets a direct tax (or a fee) to the price of fossil fuels such as coal, oil products and natural gas, and other fossil fuels in proportion to their carbon content. The tax could put collected in various ways: for example, a tax on domestic fossil fuel consumption, a tax on primary energy inputs on refineries, gas transportation systems, etc. Carbon tax is used to change the relative prices between renewable and fossil fuel resources, incentivizing renewable energy use and disincentivize fossil fuel use. The tax is usually passed from suppliers to consumers in the form of higher prices for electricity, gasoline, heating oil, and other goods and services that use fossil fuels in their production process.

Examples of carbon tax, share of emissions covered and revenues generated.

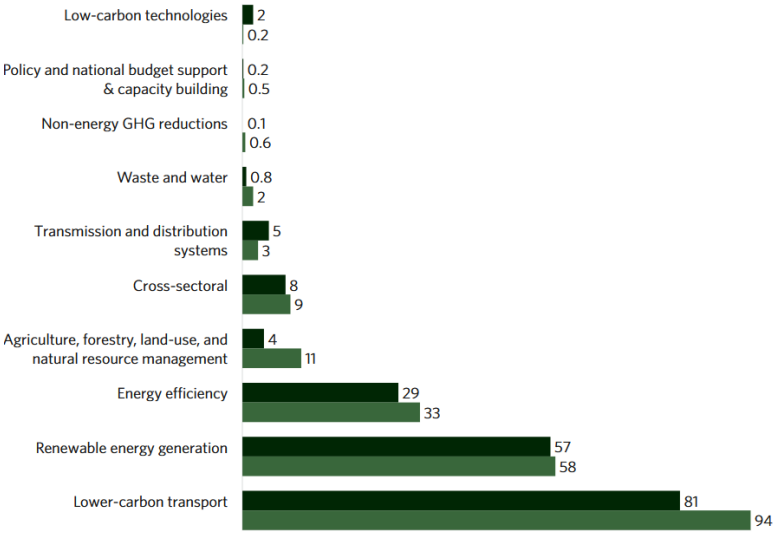


Source: State and Trends of Carbon Pricing (2021)

Cap-and-trade system or emission trading system (ETS):
Following the Kyoto protocol that established quantitative targets for emission reductions by each country member, the government sets a limit or cap the level of emissions that the country/sector can emit. The countries or companies that reduce emissions below their cap can sell, an unused right to emit, measured in tonnes of CO2 equivalent while countries and companies that don't meet their target can buy these one-tonne units to make up the shortfall.

This market-based mechanism sets allowances on the total amount of carbon emissions released each year, creating a market-based system in which the allowances can be traded from less-carbon-intensive to more-carbon-intensive sectors. High-cost firms can buy permits to emit carbon from low-cost firms. This creates mutual gains between trading partners and guarantee a fixed level of emission reductions.

Tracking global climate finance to mitigation activities in 2017/2018 (unit: USD billion)



Source: Global landscape of climate finance (2019)

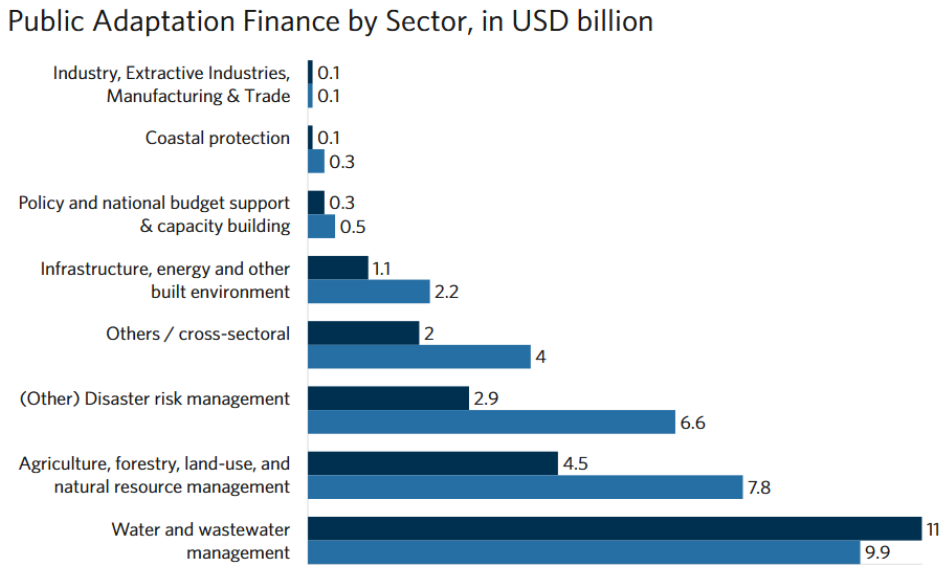
2. Adaptation policies:

- A private good in which the benefits of reduced severity accrue to one nation
- Investments that transfer wealth from good to bad states of nature given a bad event has been realized.

"Adapting to climate change with more resilient infrastructure, securing water resources, improving crop production for dryland farming, protecting coastlines, and other measures can pay a triple dividend. Countries will suffer less from future climate shocks, enjoy greater productivity and growth, and reap social and environmental benefits.

Adaptation can take many forms beyond direct government financing of infrastructure. It involves encouraging the private sector to adapt, social protection after disasters, and a holistic strategy for budgeting and planning that factors in climate change.

According to a report from the Global Commission on Adaptation, every $1 invested in adaptation could yield up to $10 in net economic benefits, depending on the activity. The benefits of adaptation measures are obvious and save money in the long run, but they require up-front costs that are a struggle for many developing economies.

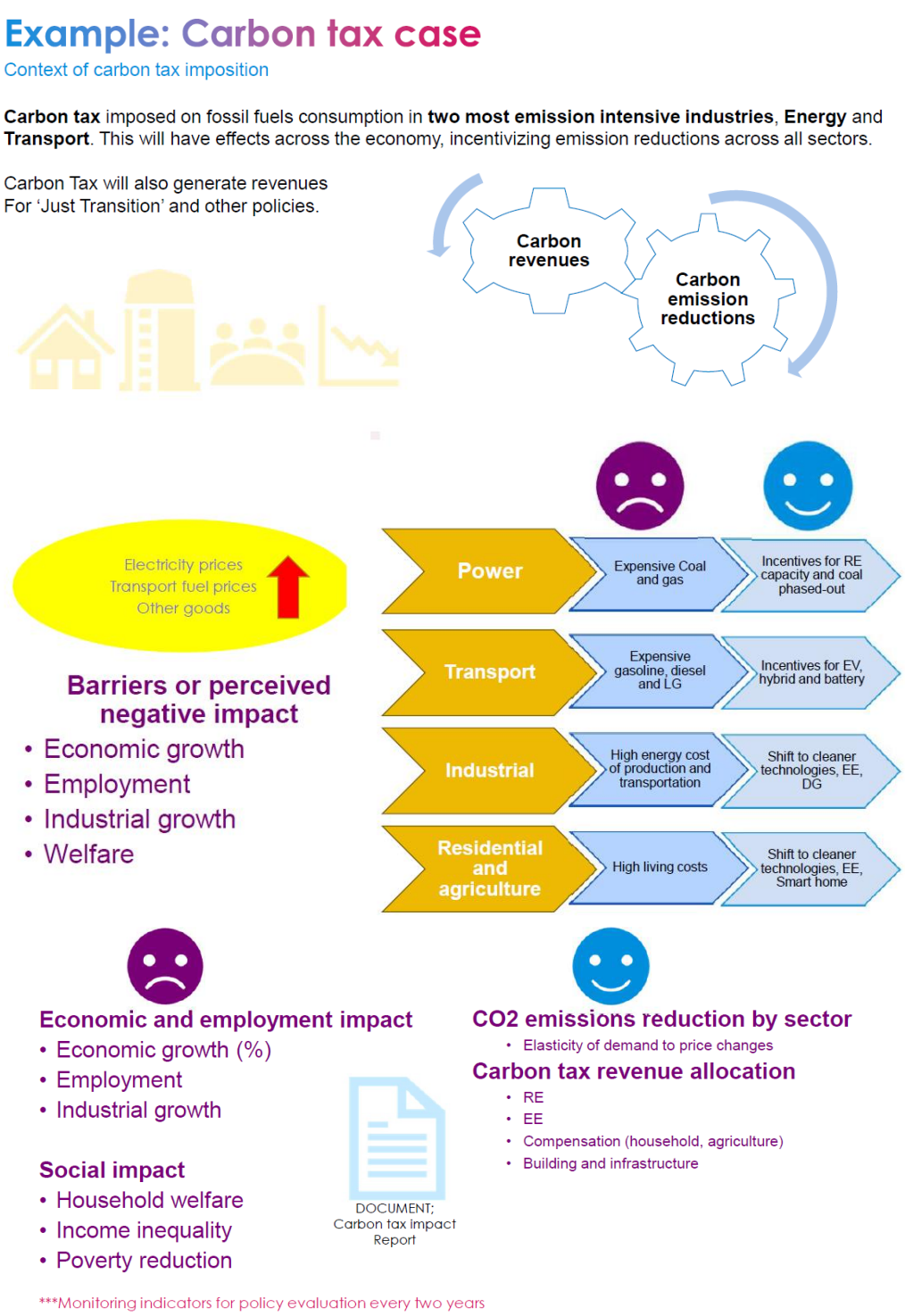


Source: Global landscape of climate finance (2019)

Reference:

HSW [HSW] – Hanley, N., Shogren, J. and White, B., Introduction to Environmental Economics 2013 (2nd edition), Oxford University Press, Chapter 9.
IPCC (2021)
IMF (2021)
Global landscape of climate finance (2019)

Annex: Consider the impacts of carbon tax



Additional Note:

Link to a research article: Carbon tax incidence on household demand: Effects on welfare, income inequality and poverty incidence in Thailand

Link to poster presentation: Poster presentation on the topic