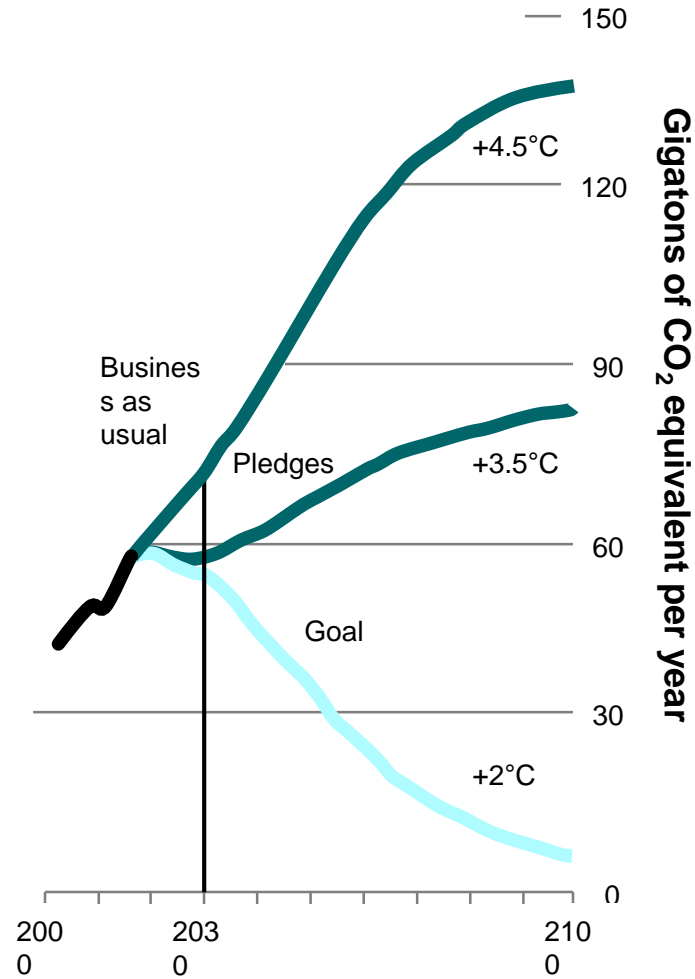


Climate change – mitigation, adaptation, and sustainable transition

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COP21 pathways



How to cope

- Mitigation:
 - Regulation (command and control approach).
 - Pricing of GHG – carbon markets (ET, offset markets), taxes and subsidies.
 - Technology support policies (FiT at renewables).
 - Information and voluntary approaches.
 - Systemic transformation → sustainable transition.
 - Adaptation:
 - Multiple issues at national level.
- + comment on technological development
- + comment on geoengineering

Regulation (command and control approach)

- Technology standards (biofuel blend mandate...)
- Performance standards (fleet average CO₂ vehicle efficiency)
- Prohibition or mandating of central products or practices (bulbs, vacuum cleaners)
- Certification, reporting requirements; land use planing...

Vs. no incentives for going beyond the limits they set.

Vs. limited flexibility on where and how to reduce pollution.

Vs. politically-motivated loopholes.

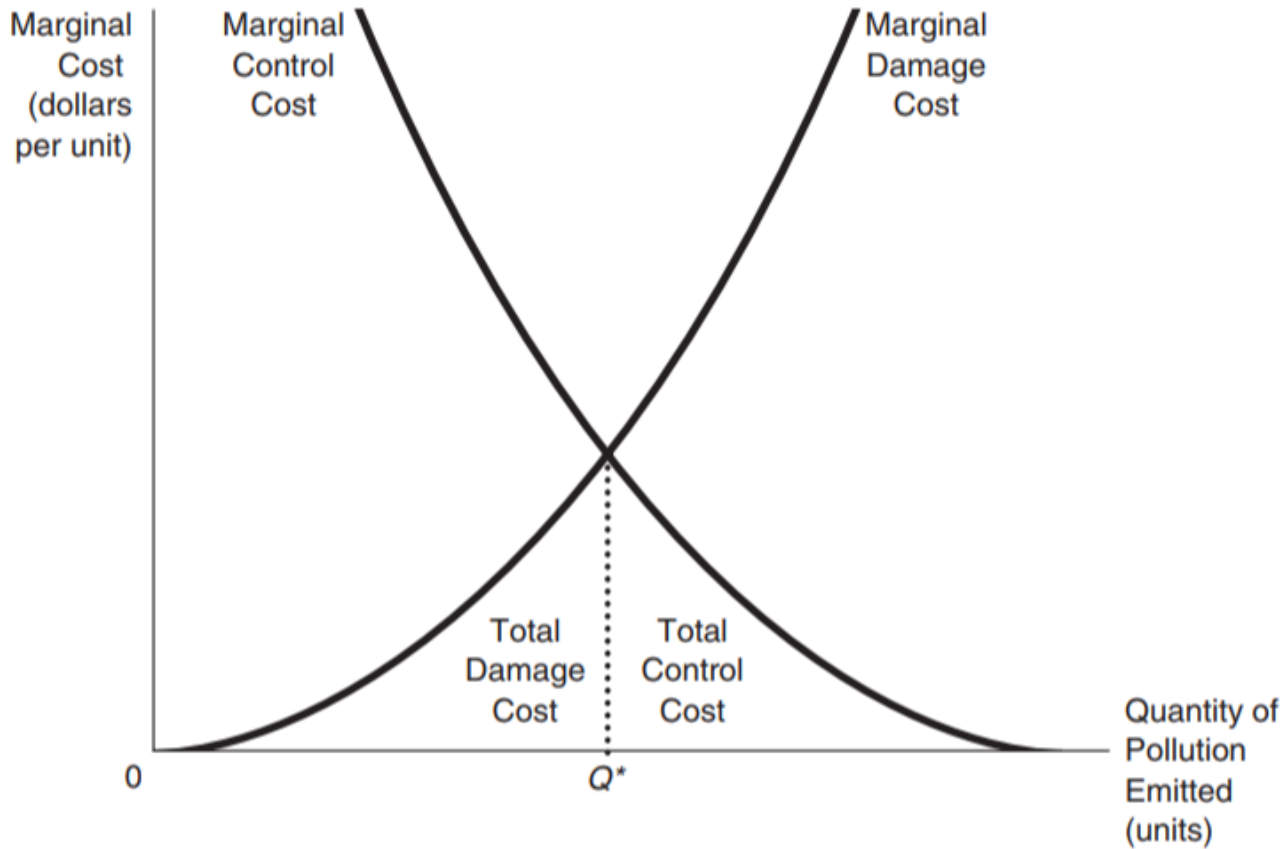
Regulation – example of LCP BAT regulation

- Large combustion plants (thermal input of more than 50MW, such as heating and power stations) regulation.
- In 2017 as a supplement to Directive 2010/75/EU. (The Directive in force since 2016, but the Czech Republic an exception to 2020).
- By mid 2021 their emissions need to be in line with Best Available Techniques. (SO_2 , NO_x , PM_{10} , Mercury.)
- 3500 installations in the EU.
- According to the Association for District Heating of the Czech Republic (Teplárenské sdružení ČR) an additional costs of CZK 44 bn.
- (Czech) companies asking for exemptions – for example CEZ for Tušimice (PM_{10}), Trmice (NO_x , SO_2), Mělník 2 and 3 (NO_x).

Carbon pricing

- To decrease demand we need to raise the cost (of carbon). Trying to find the balance of the costs and benefits of carbon production, not reducing it entirely. To internalize the externalities. (Global atmosphere as one of the global commons, the spaces beyond sovereign jurisdiction – tragedy of commons)
- Instruments that reach throughout the economy, influencing all production and consumption decisions.
- 1) figuring out how much carbon we want to put into the environment. 2) Then a cost must be applied:
 - applying tax on it (Pigouvian tax)
 - cap-and-trade mechanisms, carbon offsetting.
- Both these systems raise some revenue that could be used to offset the negative macroeconomic impacts of (energy) price rises.

What amount is the right amount?



Carbon taxes

- Norway – oil products, emissions from oil and gas production and gas used for heating and transport. Sectors covered by EU ETS exempted, with exception of the offshore oil and gas sector. From 2013 the tax level has been increased to offset the falling EUA price.
- Japan – introduced in 2012 to raise revenue for energy efficiency and RES programmes, not as a direct price incentive.
- Switzerland – CO₂ levy intended as an incentive for energy efficiency and shifting toward cleaner heating and process fuels (not to raise revenue). 120 CHF/tCO₂.
- British Columbia (Canada) – USD30/ton. Revenue neutral, compensated by income and corporate tax cuts. Consumption fuels dropped by 5-15%, while in the rest of Canada increased by about 3%. GDP continued to increase.

Carbon taxes – Czech Republic

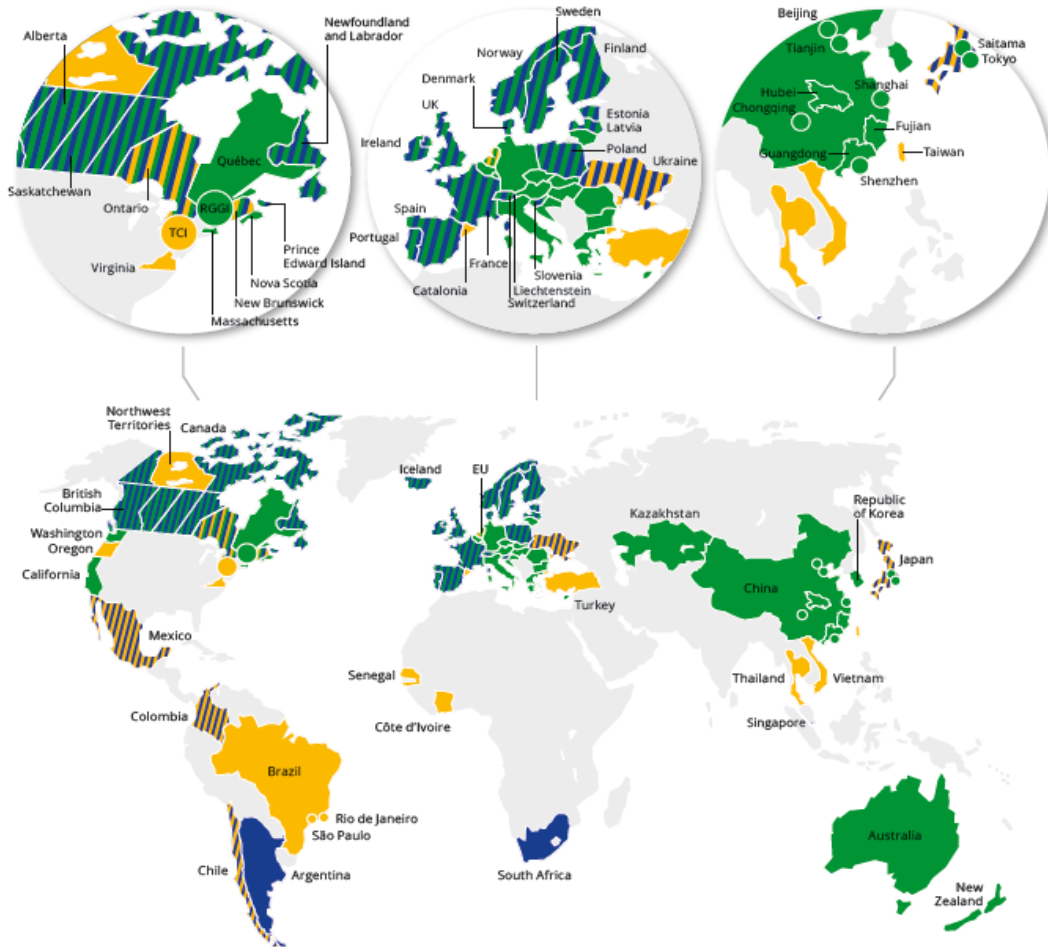
- Suggested multiple times.
- In 2012 to complement EU ETS and to include smaller emitters (small companies, households) – on natural gas, coal and heating oils (€15/tCO₂) – failed.
- In 2019 suggested again, to protect system of central heating and to fulfill the EU goals. About €15/tCO₂. (Family house heating with coal about 4500CZK/y, natural gas 1300CZK/y). (To be decided by the next government).
- *Should the carbon tax be introduced in the Czech Republic?*

Cap and trade systems (Emission trading)

- A government assigns to itself the right to put emissions into the environment.
- It defines what it believes to be the socially optimal quantity of emissions.
- The government generates a number of permits equal to the amount of allowable emissions.
- These permits are allocated to emitters to trade with them – market is created.

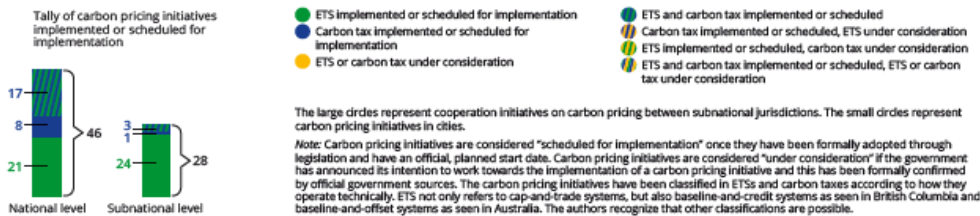
= economically efficient, provides incentives for effectiveness of the system. To develop technology that would allow one to reduce emissions at a cost lower than that of buying a permit, that spurs innovation and technological development.

EU ETS, Assigned Amount Units (AAU) of Kyoto.



2019 - 57 carbon pricing initiatives

- This consists of 28 ETSs in regional, national and subnational jurisdictions
- 29 carbon taxes, primarily applied on a national level
- these carbon pricing initiatives cover 11 GtCO₂ e, or about 20 percent of global GHG emissions, similar as compared to 2018.



ET and the Czech Republic

- Regular sales of AAU to Japan and other customers.
- Worth tens of billions of CZK.
- 50% of income to environmental projects (Zelená úsporám 2009 – 2012, 2013-2021), rest to the national budget.
- Zelená úsporám
 - Exchange of boilers in residential housing (biomass)
 - Housing isolation and improvements (new windows etc.).

Offset mechanisms (part of the carbon markets)

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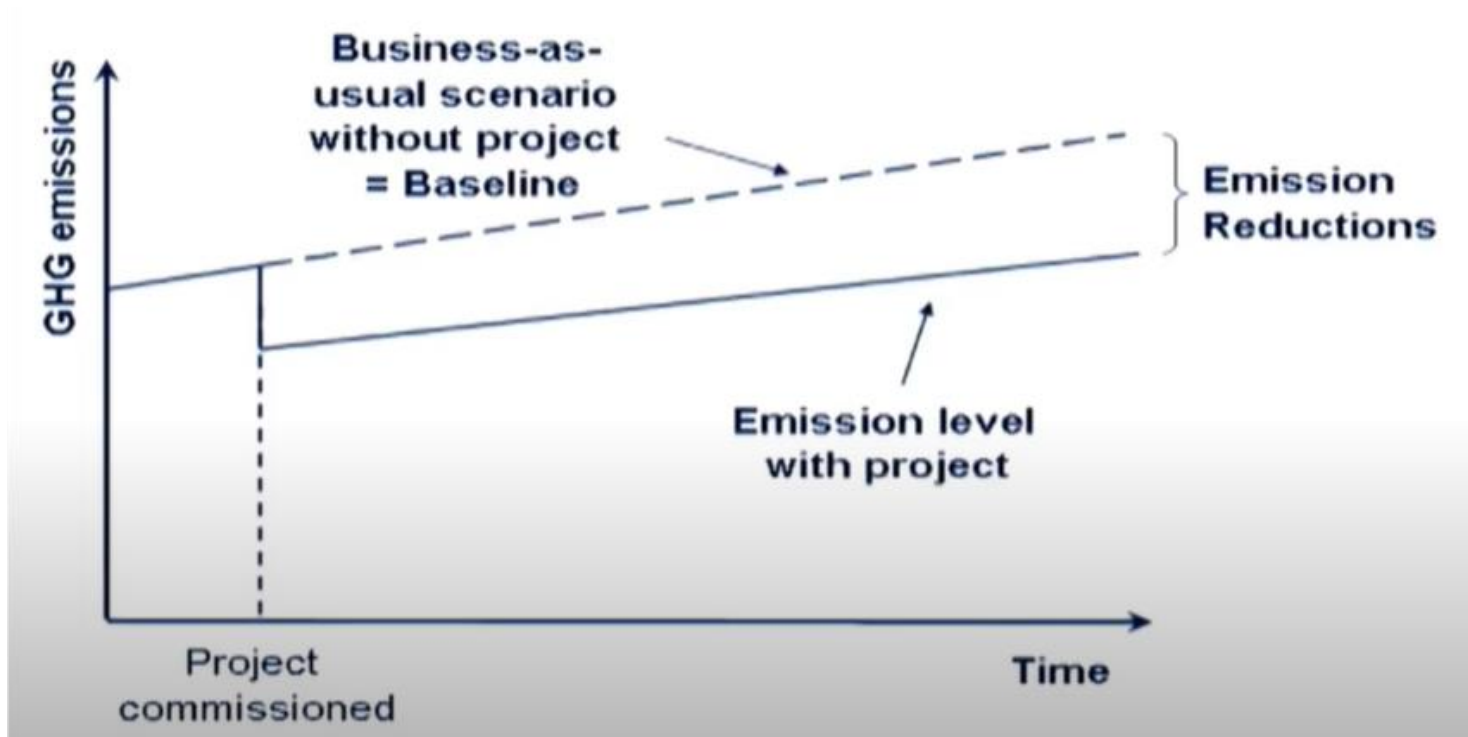
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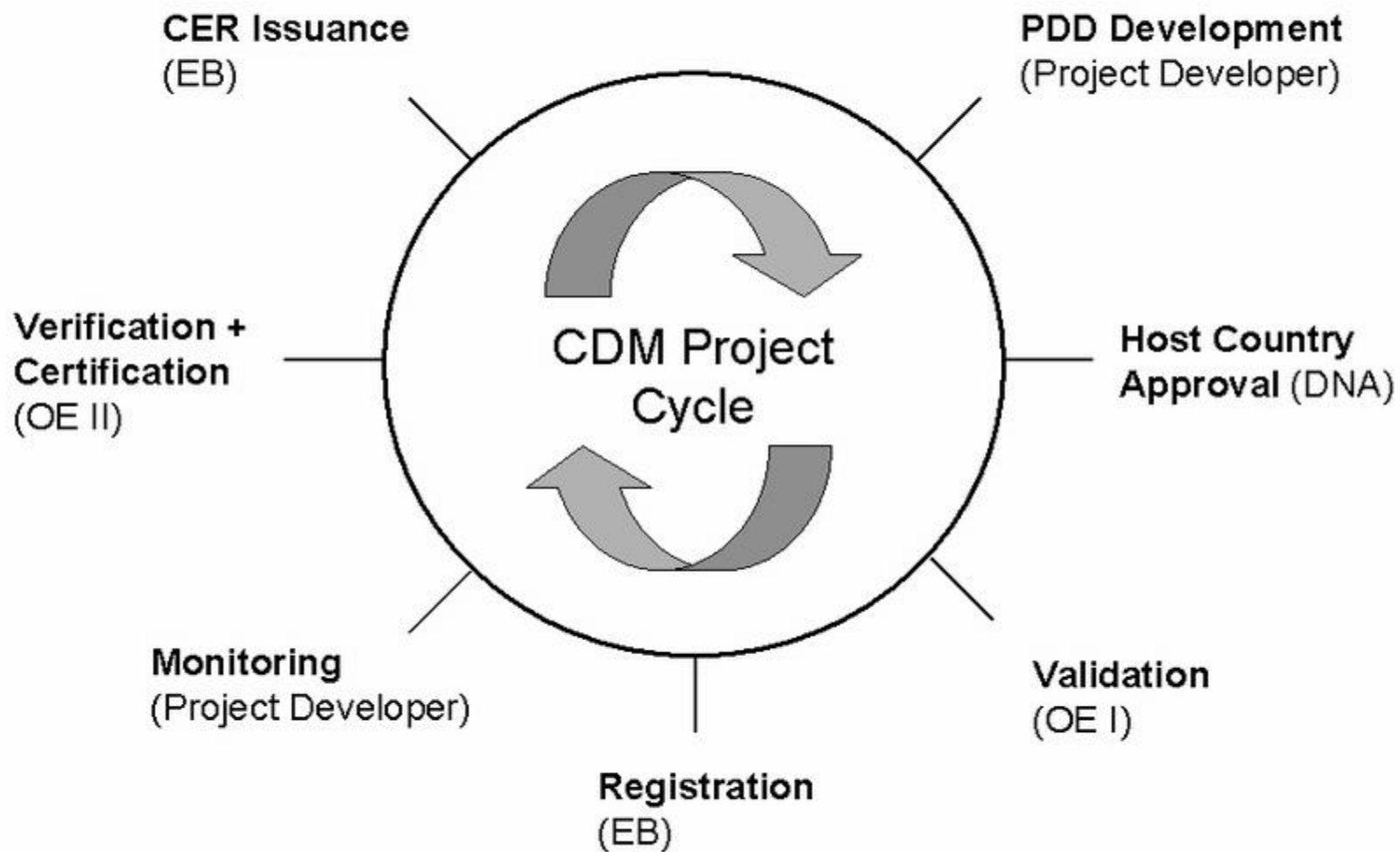
CDM

- Project based market mechanism
- Annex I. countries invest (indirectly, via credits) in non-Annex I. countries. Non-annex I. countries are helped with sustainable development and related benefits (health benefits, clean jobs, cleaner environment, transfer of technologies, etc.).
- About 2.7 bn tCO₂e in 2008-2012. Largest source of mitigation finance to developing countries. USD95bn in clean energy investments.
- China about 50% and India about 20% of projects.

CDM



- Emissions need to be real, additional, verifiable, permanent. And they should contribute to communities at a local level.



Carbon tax vs. cap and trade system

- Carbon tax:
 - Simpler to understand, easier to built, more transparent.
 - Keeps pushing for reducing the emissions despite technology development.
 - Implemented more quickly.
 - Greater price predictability.
- Cap and trade system
 - Avoids negative connotation of 'tax'.
 - Some companies are effective in lobbying for exemptions.
 - Known reduction of emissions, unknown price.

Climate (in)justice of carbon markets

- Distribution of allowances in ET – original idea based on population, in Kyoto and later in Paris – based on existing emissions – grandfathering.
- Climate fraud – markets does not work due to the overallocation, windfall profits, etc.
- If markets work, they work in a way of benefiting the rich on the expense of poor (in a way of indulgences used to work). Money also goes primarily to China and India.
- They create now form of control over disadvantaged populations (carbon colonialism).

- *To fix them or to replace them?*

Climate justice – carbon markets

- Kachtung Forest Project, Uganda, 30 000 credits, US\$33 million.
 - Industrial plantation projekt led by Green Resources. 2050 ha of forest. Swedish Energy Agency stopped payments in 2015 for „*villagers were deprived of vital resources and experienced threats and violence... “ – 17 villages were denied access to plantation (food, grazing, firewood).*
- Proyecto Hidroelectrico Alto Maipo,, Chile, 530MW (no dam).
 - Impact on local biodiversity and environment, land rights conflict emerged, increased tension in the community (divide and conquer approach).

Deep system transformation

	Carbon pricing strategies	Sustainability transition policy
Conceptual roots	Neoclassical economics	Innovation studies, evolutionary economics, inst. theory
Problem framing and solution orientation	Climate change as a market failure, price carbon to correct market signals	Climate change as a system problem, needs of fundamental transformation
Overriding policy priority	Efficiency – to reduce emissions while keeping costs at minimum	Effectiveness – drive down emissions as quickly as possible
Innovation approach	Incremental change, indirect stimulation of innovation	Transformative change, direct stimulation of innovation
Contextual considerations	Universality – carbon pricing for all jurisdictions and sectors	Tailoring – policies should be adapted to local and sectoral context
Understanding of politics	Revenue recycling to deal with political realities	Creation of alternatives and formation of supportive coalitions

Based on Rosenbloom, D. et.al. – see recommended literature in Online Syllabi.

Climate Change Adaptation, selected sectors

Water

- Expand water storage and desalination
- Improve watershed and reservoir management
- Increase water-use and irrigation efficiency and water re-use
- Urban and rural flood management

Agriculture

- Adjust planting dates and crop locations
- Develop crop varieties adapted to drought, higher temperatures
- Improved land management to deal with floods/droughts
- Strengthen indigenous/traditional knowledge and practice

Infrastructure

- Relocate vulnerable communities
- Build and strengthen seawalls and other barriers
- Create and restore wetlands for flood control
- Dune reinforcement

Human health

- Health plans for extreme heat
- Increase tracking, early-warning systems for heat-related diseases
- Address threats to safe drinking water supplies
- Extend basic public health services

Climate justice – poor vs rich?

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