

Tools and methodologies for modelling and assessing the impacts of the implementation of response measures

Session 2:

Policy responses to address impacts of the implementation of mitigation policies

Singapore's Energy Transition

Perspectives of a small island city state

**Peter Govindasamy,
Senior Director (Climate Change International Team)
Ministry of Trade and Industry, Singapore**

Outline

1. Double Impact of Response Measures
2. Illustrating the Double Impact with the specific example of Singapore
3. Policy responses to address the impact of the implementation of response measures

1. Double Impact of Response Measures

Recap: Paris Agreement, 2015

- ❑ “Double Impact”: Parties may be affected not only by climate change but also by the impacts of the **measures taken in response to it** (“response measures”)
- ❑ Parties shall take into consideration in the implementation of the Paris Agreement, the concerns of Parties with economies most affected by the impacts of Response Measures, particularly developing country Parties

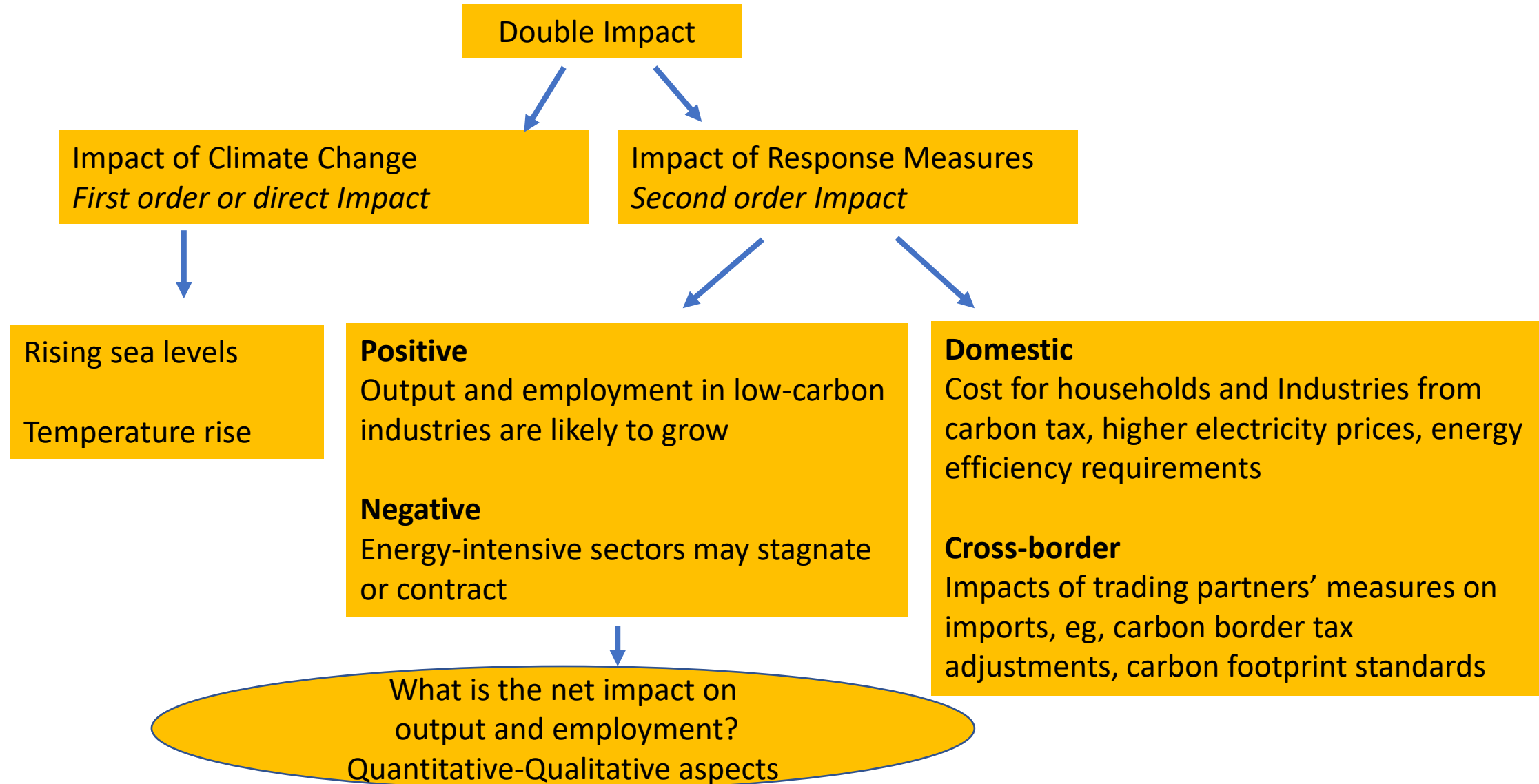
Cf Convention Arts 4: 9, 10 - categories of countries which are vulnerable to the adverse impacts of the implementation of response measures, for example

- ✓ Small Island countries
 - ✓ Economies which are highly dependent on...production.. consumption of fossil fuels and associated energy intensive products
 - ✓ Parties which have serious difficulties in switching to alternatives, ie., “Alternative Energy Disadvantaged Countries”
- ❑ Parties should take into account the imperatives of just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities

*Examples of Response Measures

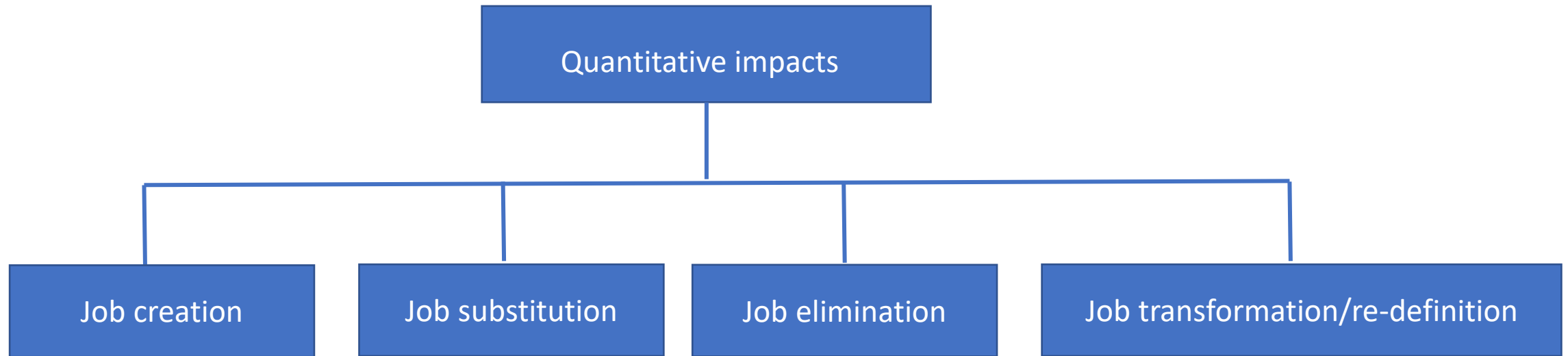
- ❑ Carbon/Energy taxes
- ❑ Cap-and-trade schemes and offsets
- ❑ Carbon border Tax Adjustments
- ❑ Carbon Credit initiatives
- ❑ Carbon/Energy efficiency standards/labelling requirements
- ❑ Carbon/Energy subsidies

Double Impact: Parties may be affected not only by climate change but also by the impacts of the measures taken in response to it



Net impact of Response Measures

- Quantitative impacts: number of jobs affected
- Qualitative impacts: the quality of jobs created or transformed



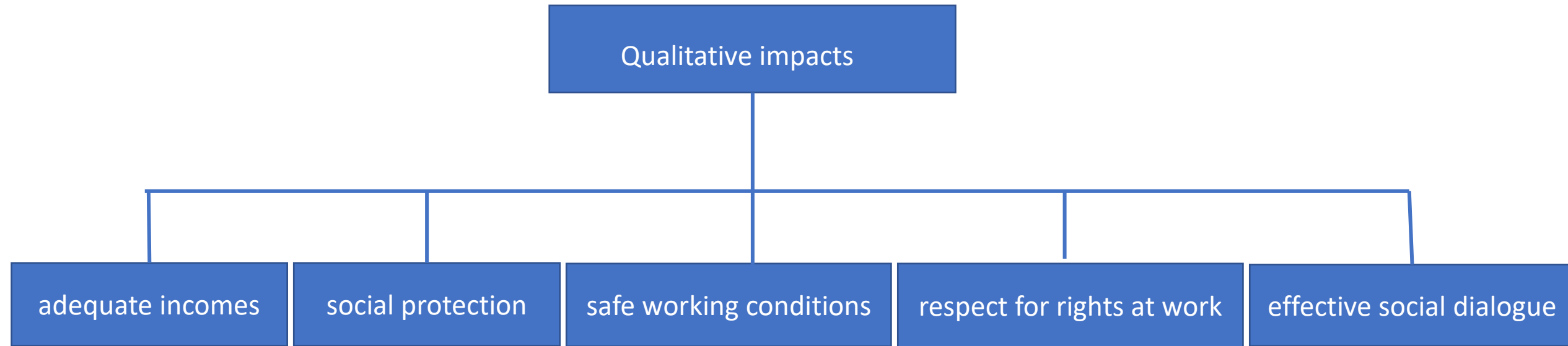
- ❑ The scale and extent of these impacts depend on the speed and breadth of technological and market changes in the green transformation
- ❑ Policymakers must smooth this transformation by developing just transition policies for affected workers, enterprises and their communities

Source:

Just Transition of the Workforce, and the Creation of Decent Work and Quality Jobs.
Technical paper, UNFCCC. 2017

Net Impact of Response Measures

- Quantitative impacts: number of jobs affected
- Qualitative impacts: the quality of jobs created or transformed



Source:

Just Transition of the Workforce, and the Creation of Decent Work and Quality Jobs.
Technical paper, UNFCCC. 2017

2. Illustrating the Double impact with the example of Singapore

- National Circumstances
- Climate Efforts, Energy Transition
- Double impact

Singapore's National Circumstances

Small Island City State. Alternative Energy Disadvantaged



Singapore accounts for only about 0.1% of global emissions.

Physical Geography

- Small size (730km²)
- Densely populated (7,800 pax per km²)
- Flat, low lying (highest point, 163 m)

Naturally constrained, No natural resources

- Land
- Manpower
- Energy
- Water
- Food

Energy constraints

- Singapore imports almost all of our energy.
- Shifted to the cleanest burning fuel (**natural gas**), making up 95% of electricity production
- Continue to **facilitate the adoption of renewable energy** where technically/economically feasible
- **Limited renewable energy options** e.g. hydro, wind, geothermal
- Deployment of solar is limited due to land constraints

Singapore's Climate Efforts, Energy Transition



Enhanced 2030 Nationally Determined Contribution (NDC)

Peak emissions at

65 MtCO_{2e} around 2030

Based on current projections, this will allow us to achieve a 36% reduction in emissions intensity from 2005 levels by 2030.

MITIGATION

Transformations in Industry, Economy, Society

POWER GENERATION	INDUSTRY	TRANSPORT	BUILDINGS	HOUSEHOLDS	WASTE & WATER
- Energy efficiency - At least 2 GWp of solar energy by 2030 - Low-carbon technologies	- Energy efficiency - System-level solutions - Low-carbon technologies	- Zero private vehicle growth 9 in 10 peak period journeys on "Walk-Cycle-Ride" by 2040 - Cleaner vehicles by 2040	80% green buildings by 2030 - Super Low Energy Programme	- Mandatory Energy Labeling Scheme - Minimum Energy Performance Standards - Green Towns Programme	- Circular economy approach - Waste - Recycling - Energy efficiency of desalination and used water treatment

CARBON TAX Initial rate of **S\$5/tCO_{2e}** ▶ **S\$10-S\$15/tCO_{2e}** by 2030



Adoption of Advanced Low-Carbon Technologies
e.g. Carbon capture, utilisation and storage, use of low-carbon hydrogen

Effective International Collaboration
e.g. International climate action, regional power grids, market-based mechanisms




Long-Term Low-Emissions Development Strategy (LEDS)

Halve emissions from its peak to

33 MtCO_{2e} by 2050 & net zero

emissions **as soon as viable** in the second half of the century

ADAPTATION



Coastal Protection, Water Resources & Drainage

Protecting our coastline from sea level rise
Ensuring water resilience, holistic stormwater management, and flood protection



Biodiversity & Greenery

Strengthening resilience of our biodiversity and ecosystems



Buildings & Infrastructure

Keeping our buildings and infrastructure safe



Public Health & Food Security

Strengthening resilience in public health and our food supply



Network Infrastructure

Keeping our essential services, including transport and network infrastructure, running well



Urban Heat Island (UHI) Effect

Mitigating the UHI effect to strengthen our resilience in the face of rising temperatures

Decarbonising the energy sector is key in greening our economy

- ❑ The energy sector powering industries and households contribute 40% of direct emissions
- ❑ Demand for energy will grow as we digitalise the economy and electrify transport and processes
- ❑ Energy transition is challenging. Renewable energy options are not available to us. Little wind, hydro, or tidal power
- ❑ Solar is the most viable form of renewable energy. However, we have heavy cloud cover and limited land available to expand solar energy capacity
- ❑ Despite the limitations and complexities, we continue to forge ahead to transform the energy sector, and reduce the carbon footprint

Sustainability underpins our economic strategies

Transforming the energy sector, Reducing carbon footprint

We continue to enhance the energy efficiency of power generation plants

- Even as natural gas remains a major source of energy before lower-carbon fuels such as hydrogen become viable

We further accelerate solar deployment, despite land constraints and dense population

- On track to achieve solar deployment target of at least 2 GWp by 2030 (equivalent to powering 350,000 households annually).
- Since 2015, solar installed capacity has increased by over 9 times to 560 MWp in 3Q 2021
- Exploring vertical solar panels to overcome our land constraints
- Looking at ways to integrate energy storage systems into the grid - to overcome the intermittency of solar energy, and manage the stability and resilience of the energy grid

Meaningful abatement however can only be achieved through:

- Developing the use of low-carbon alternatives in the longer term
- Tapping renewable energy beyond our shores

Develop the use of low-carbon alternatives

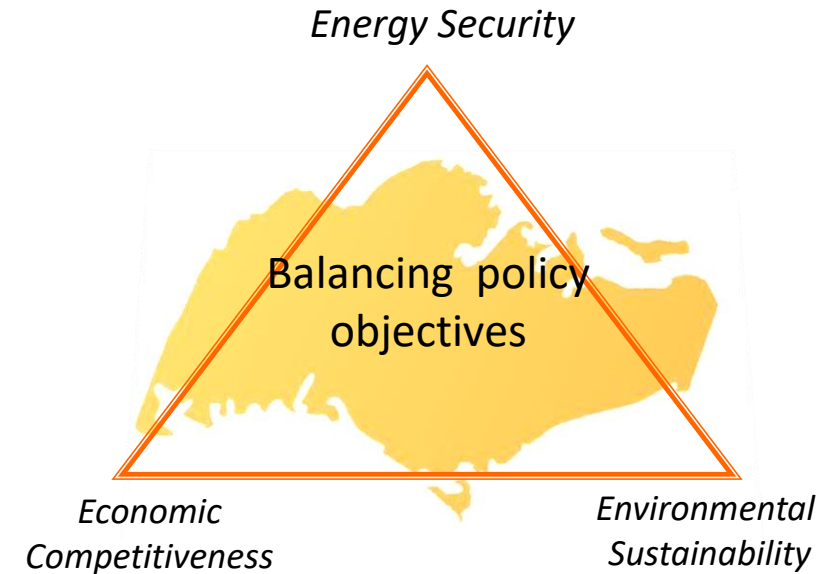
- ❑ Low-carbon hydrogen and carbon capture, utilisation and storage, have the potential to be game-changers, especially for hard-to-abate sectors such as Energy and Chemicals
- ❑ However, these technologies will take time to mature and become more commercially viable.
- ❑ We are studying how we can catalyse the development of these technologies

Tapping renewable energy beyond our shores

- ❑ We plan to import up to 4GW of electricity by 2035. This will constitute around 30% of Singapore's electricity supply
- ❑ In the interim, we will conduct small-scale 100MW trials and pilots. This will help us learn, build confidence, and pave the way for our larger-scale electricity import projects

As we take bold steps to address climate change, we remain pragmatic

- ❑ Balance various policy objectives
- ❑ Assist enterprises
- ❑ Support workers in the green transition



Double impact on Singapore as small island city state, which is also Alternative Energy disadvantaged

Impact of Climate Change

- Sea level rise poses an existential threat to Singapore as a low-lying city state
- Protecting against rising sea levels could cost ~\$100 billion over 100 years
- Annual mean temp (degC) has been rising since 2009, coupled with dry spells and more intense rainfall

Impact of Response Measures

Domestic Impact:

- Enhanced Nationally Determined Contribution (NDC) absolute emissions limitation target, ie. 65 MtCO₂e
- Long-term low-emissions development strategy (LEDS) halve emissions to 33 MtCO₂e by 2050 to achieve net zero emissions as soon as viable

Cross-border Impact:

- Trade is three times our GDP
- We import for our needs: Energy, Water, Food
- Trading partners response measures would have impact on our exports: Carbon Footprint Standards ; Carbon taxes, tariffs; Carbon Border Adjustment Mechanism



3. Policy responses to address the impacts of the implementation of mitigation policies

- a. Pre-emptive Cooperation, Coordination, Coherence
- b. Good practices at the International Level
- c. Whole-of-Coordination at the National Level
- d. Stakeholder Engagement at the National Level

3a. Pre-emptive cooperation, coordination, coherence

IPCC 5th Assessment Report:

There are numerous and diverse explored opportunities for greater international cooperation in *economic*–climate interactions. While mutually destructive conflicts between the two systems have thus far been largely avoided, pre-emptive cooperation could protect against such developments in the future

To take place at two levels, three contexts

Within International organisations
UNFCCC's Forum

Between International Organisations
UNFCCC, ILO

At the National Level
Whole-of-Government coordination -
Economic, Environment, Energy,
Manpower Ministries

International level

National level

3b. Good practices at the International level

- ❑ All countries need to act
- ❑ International cooperation to address the global climate challenge.
- ❑ Economic growth and development essential for parties to effectively address climate change
- ❑ National circumstances must continue to guide each Parties' climate efforts, Parties to take account of other parties' national circumstances
- ❑ Climate efforts must be anchored in the rules based multilateral system, respecting the principles and provisions of the UNFCCC, and related organisations



Two lower hanging actionables to cushion the Double Impact

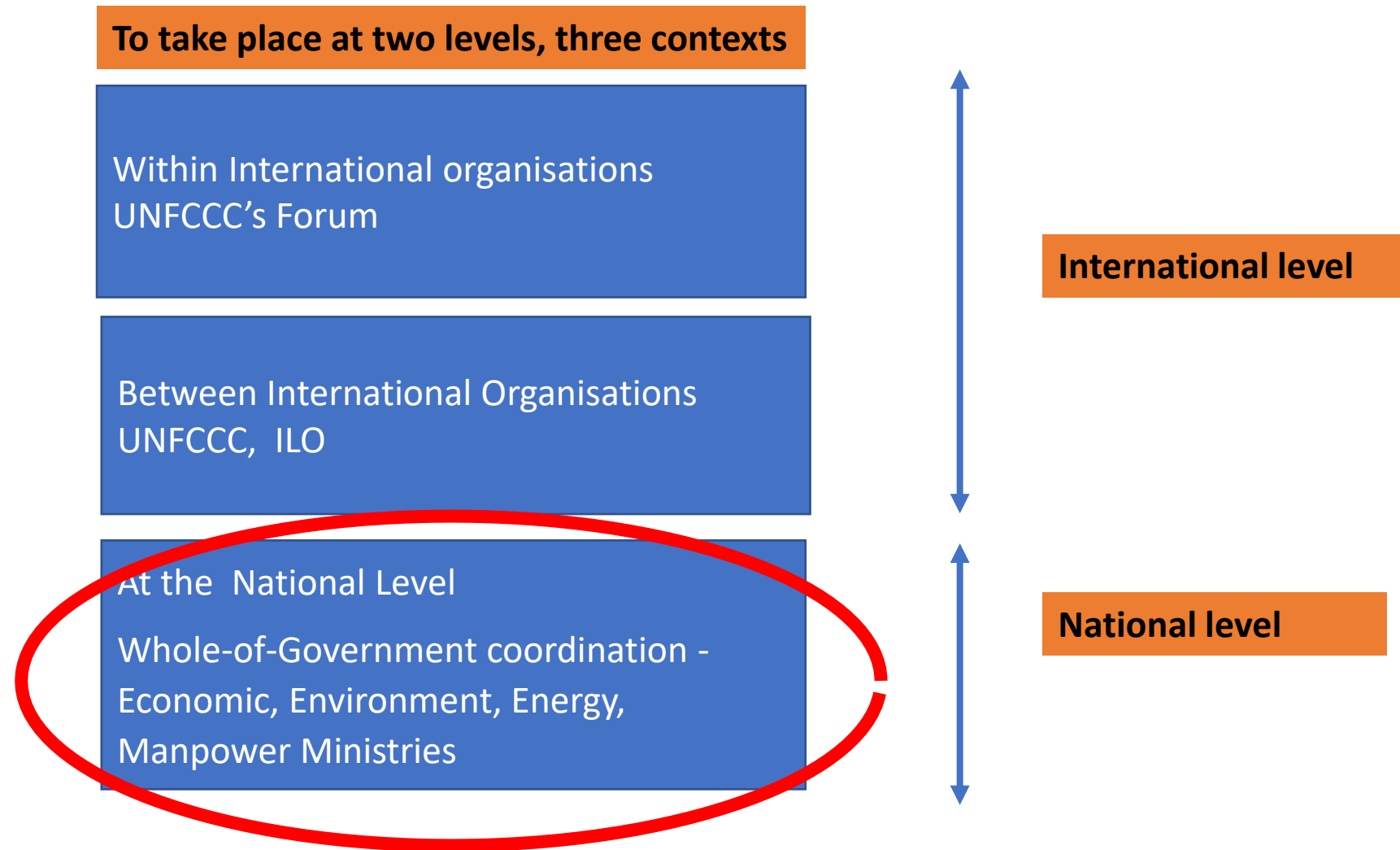
Convention Article 3:5 – Parties to keep Markets Open

- Parties mandated to promote a **supportive and open international economic system**
- Measures taken to combat climate change, **should not constitute a means of arbitrary or unjustifiable discrimination or disguised restriction on international trade**

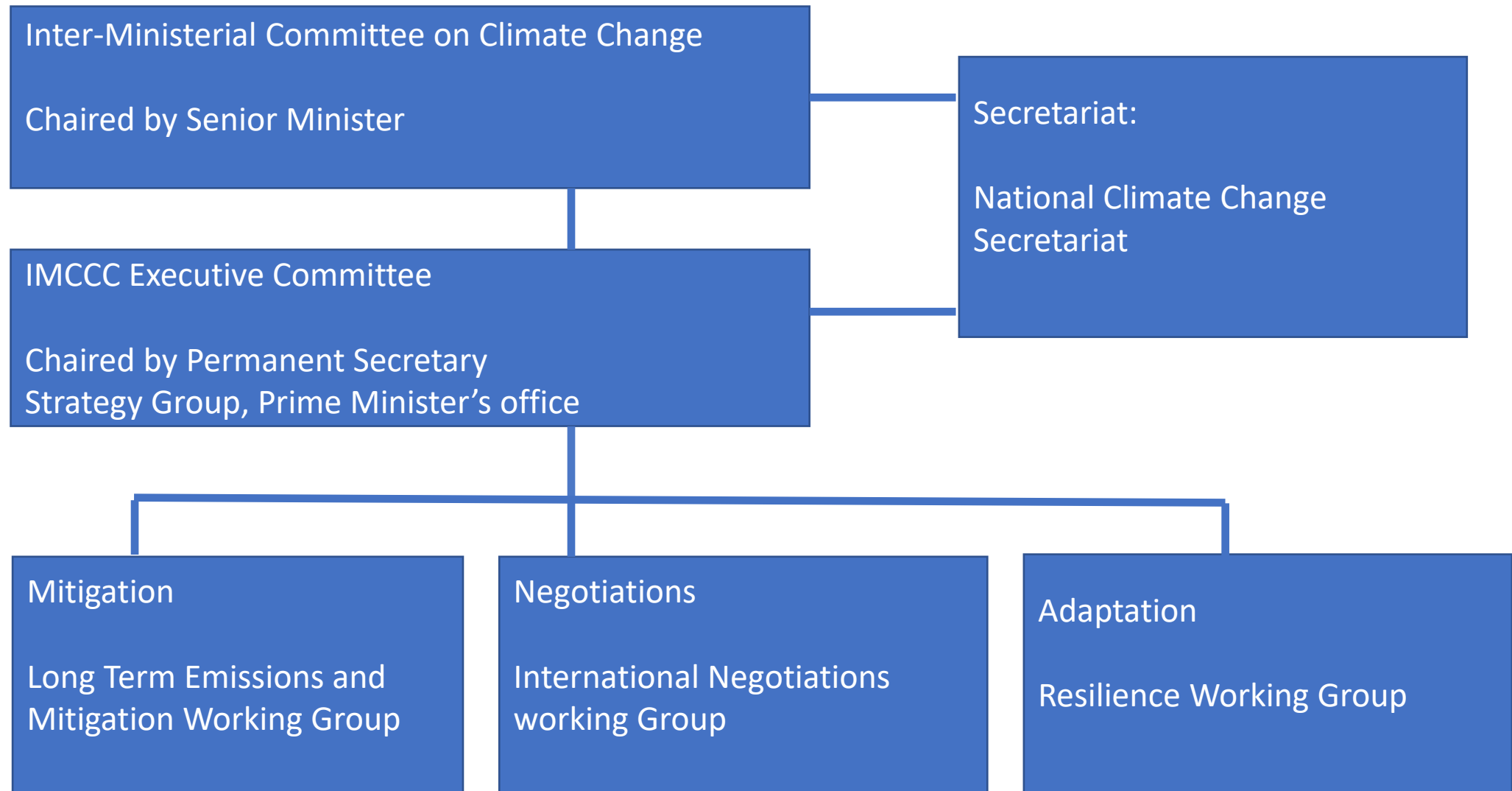
Convention Article 4: 8,10 – Parties to take account of AED constraints

- Parties to take into consideration in the implementation response measures/the commitments of the Convention, the situation of small island countries...and **Parties with economies highly dependent on... the use of fossil fuels for which such Parties have serious difficulties in switching to alternatives**
- Parties must factor AED constraints in the design and application of their Carbon Border Measures with cross-border implications, ie. Carbon footprint standards, CBAMs

3c. Whole-of-Government Coordination at the National Level



3c Whole-of-Government coordination at the National Level



3d Stakeholder engagement

Meeting low-emissions aspiration require the full participation of and collaboration with individuals, civil society, academia, businesses, and the Government

- ☐ Inform - what climate actions mean to stakeholders
- ☐ Socialise implications and opportunities
- ☐ Identify collaboratively ways to minimise adverse impacts of response measures
- ☐ Build consensus -generate support for action and partnerships
- ☐ Empower businesses to tap on opportunities and implement climate actions

We will continue to catalyse more stakeholder partnerships to promote climate friendly actions across all sectors

Response Measures – Energy Transition

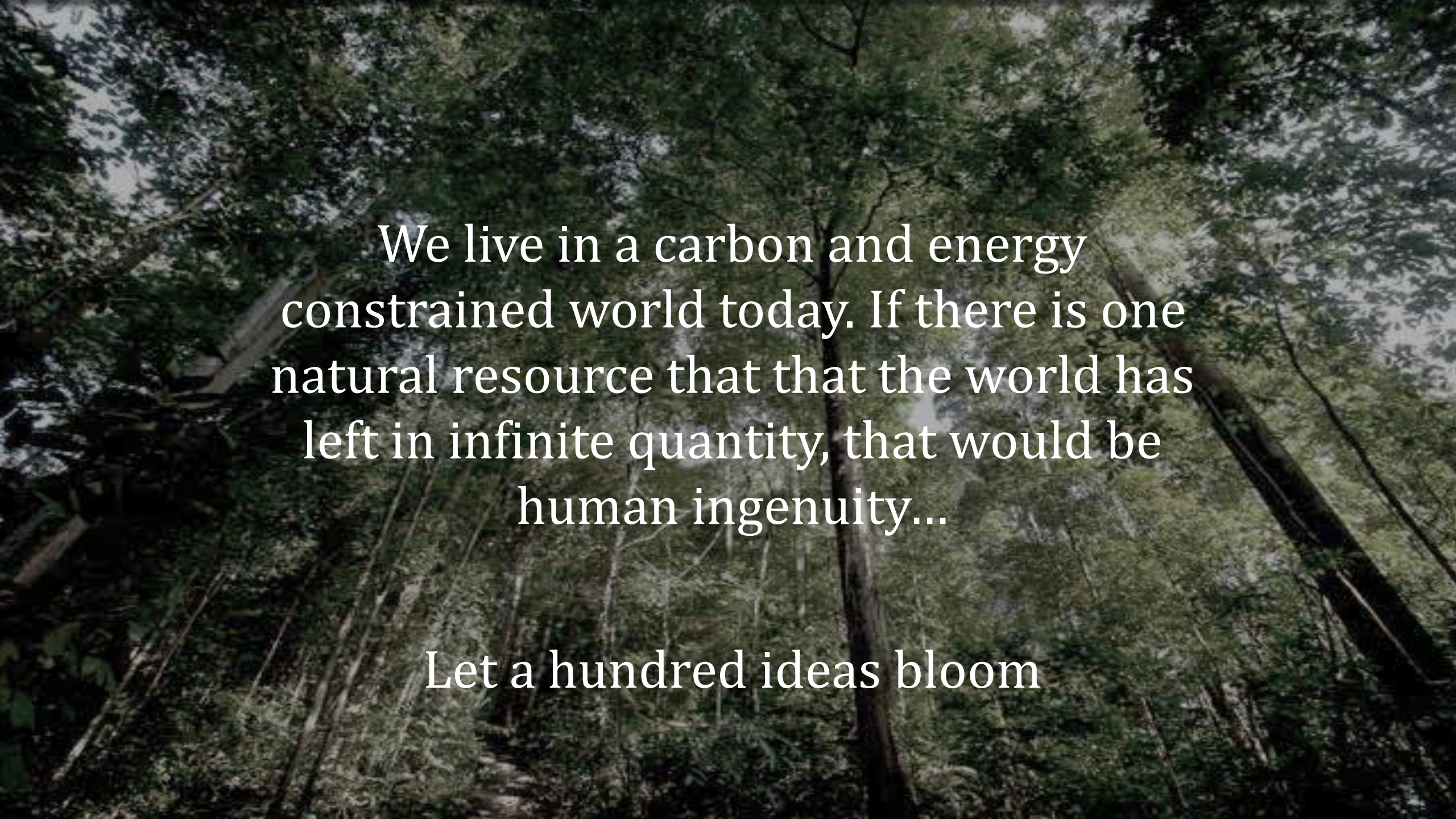
- ❑ Climate mitigation or Response Measures require the restructuring of the energy supply sector, from fossil fuel-based system to renewables, and increases in energy efficiency
- ❑ The transition to low carbon economy could have positive and negative impacts on the economy and jobs
- ❑ National Circumstances differ. No two countries are alike. The impacts are particularly acute for economies such as those which do not have renewable energy options, e.g. small island states, alternative disadvantaged countries
- ❑ Economic diversification and transformation, and just transition are the two main strategies to mitigate the adverse impact of response measures
- ❑ Deepen workforce capability. Reskilling and upskilling to keep pace with the evolving needs of the transition to a green economy
- ❑ Enabling pre-requisites: Parties required to take account of the specific situation of individual countries. This includes an open economic system for all countries to trade and grow. No raising of trade barriers. Sustainable economic growth and development is essential for countries to better address the problems of climate change
- ❑ Pre-emptive cooperation and coherence at the national level (between economic, environment and energy ministries), and within/among UNFCCC and other relevant international organisations

“Traveller, there is no path, the path is made by walking.”

- Antonio Machado

- ❑ The Convention, Kyoto Protocol and the Paris Agreement built the Response Measures road
- ❑ We have laid the foundation for a Response Measures highway in Katowice and through the Madrid Workplan
- ❑ The Vision is for us to construct and travel together on the Response Measures expressway fostering economic diversification and Just Transition, and galvanising climate action

litte by little, one walks far

A low-angle shot of a dense forest. Sunlight filters through the thick canopy of green leaves, creating a dappled light effect on the tree trunks and the forest floor. The perspective is looking upwards, emphasizing the height and density of the trees.

We live in a carbon and energy
constrained world today. If there is one
natural resource that that the world has
left in infinite quantity, that would be
human ingenuity...

Let a hundred ideas bloom