Singapore's Carbon Pricing Journey

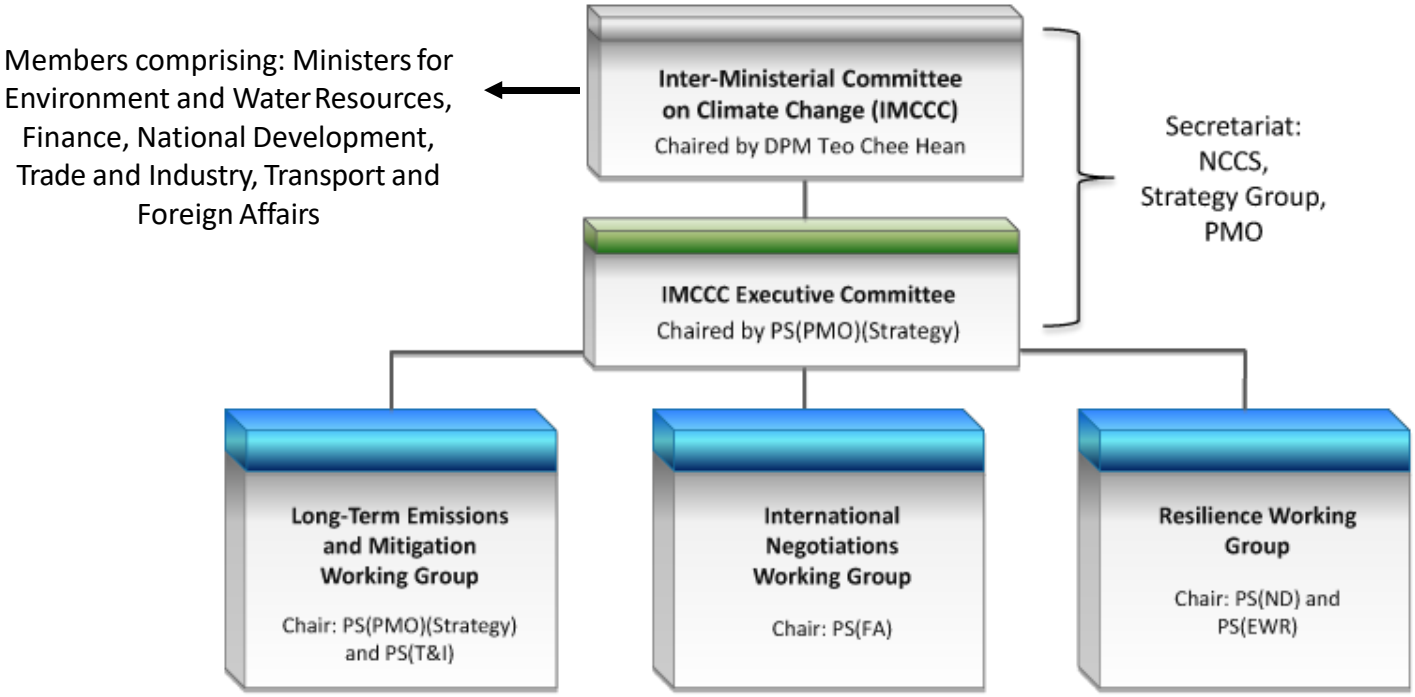
National Climate Change Secretariat, Strategy Group
Prime Minister's Office, Singapore

Coordinated Climate Policy Making

Inter-Ministerial Committee on Climate Change (IMCCC) established in 2007

- Enhance Whole-of-Government coordination on climate change policies which are cross-cutting to achieve the best overall outcome for Singapore

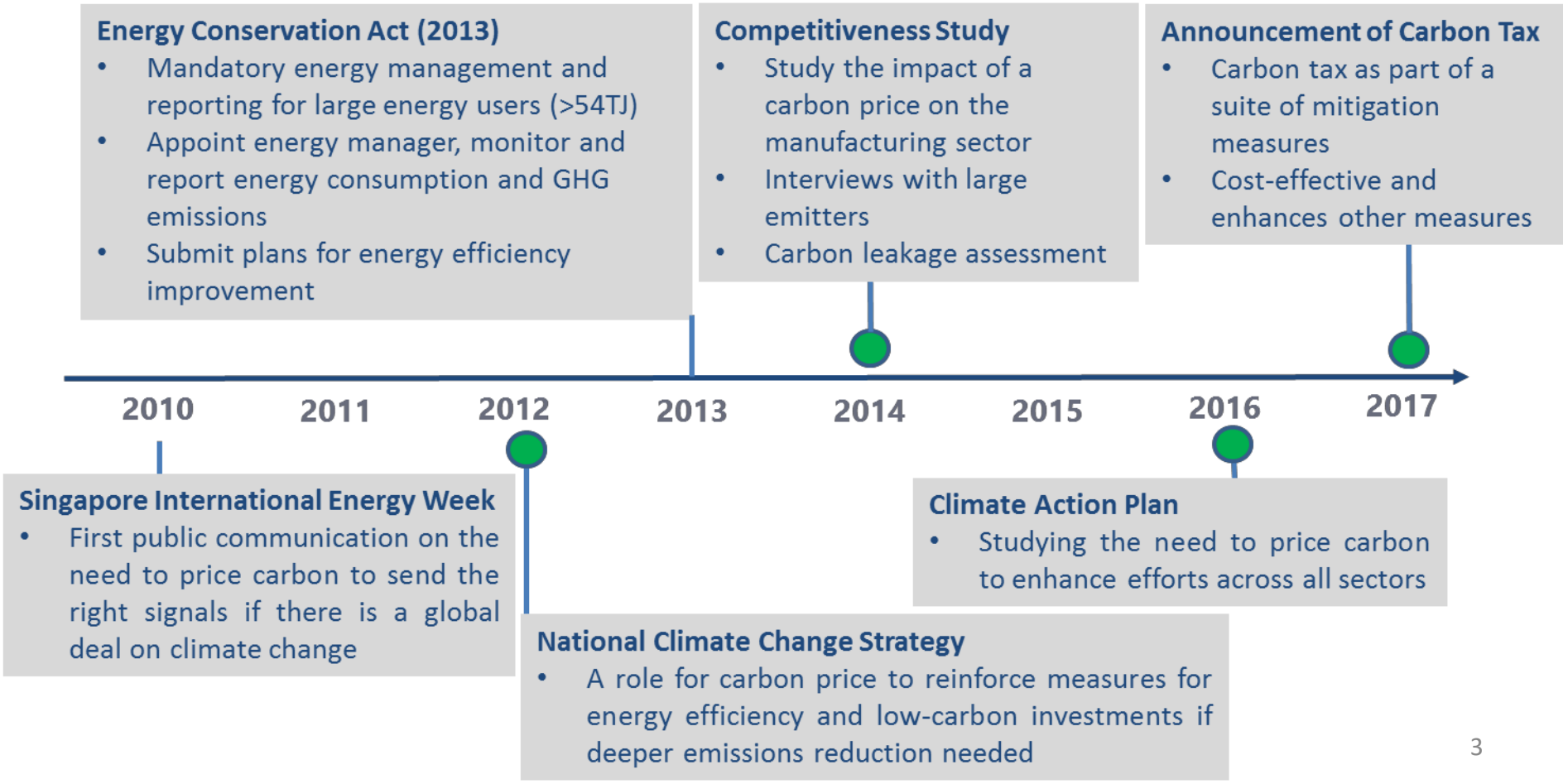
- National Climate Change Secretariat established in 2010 to support IMCCC; merged in 2016 with Strategy Group which supports the Prime Minister and Cabinet in establishing priorities and strengthening strategic alignment across Government



Long History of Preparation for Carbon Pricing

Conversations on pricing carbon started early

- Started considering carbon pricing options in 2007 in preparation for our 2020 targets
- Yearly conversations with large emitters since 2010
- Regular consultation with broader public as we updated our climate strategy
- Build on momentum and established relationships to have genuine exchanges



Long History of Preparation for Carbon Pricing

key enablers:

1. Start the conversations early
   - No surprises
   - Gives companies time to prepare their long term plans and formulate their thoughts on carbon pricing to benefit meaningful exchanges with the government

2. Build on the momentum and establish goodwill and working relationships
   - Forthcoming exchanges to socialise the issue of carbon pricing in a constructive manner

3. Principled approach of pricing scarce resources fully
   - Liberalised electricity market with no subsidies
   - Water conservation taxes

4. CDM projects promote market action by companies

Some Examples of CDM Projects in Singapore

Project Title	Sectoral Scopes	Amt of Reductions
Dehydration and incineration of sewage sludge	1: Energy industries 13: Waste handling and disposal	101,577 tCO_2e
Grid connected electricity generation plant using natural gas	1: Energy industries	286,755 tCO_2e
Biogas plant for treatment of poultry waste and recovery of biogas for electricity generation	1: Energy industries 13: Waste handling and disposal	31,837 tCO_2e
Biomass energy and wood recycling	1: Energy industries	31,360 tCO_2e
Thermal energy recovery for new applications	1: Energy industries	15,205 tCO_2e

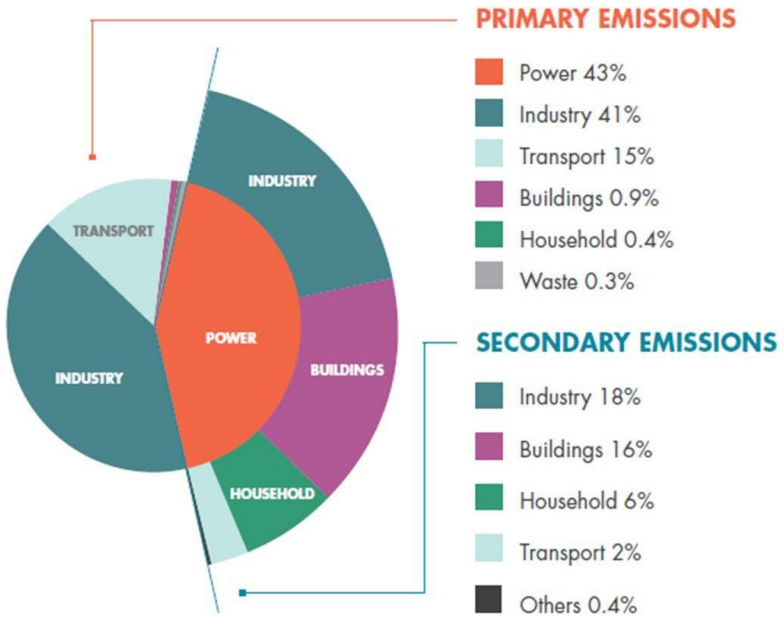
Challenges for Singapore

Economic structure

- Large industry presence for the global market
  - Manufacturing contributes 20% of GDP
  - Responsible for 60% of total emissions -> mostly from Petroleum/Petrochemical where around 70% of output are exported

- International competitiveness and carbon leakage
  - Export oriented economy; trade is 3 times our GDP

Singapore's 2012 GHG Emissions Profile



Challenges for Singapore

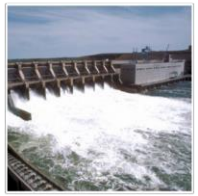
Low-carbon transition needs time

- Long industry retrofit and planning cycles; large energy efficiency projects might need to be undertaken over several cycles
- Putting in place processes to comply with MRV

Limited alternative energy options

- Solar energy is our best option but limited by land constraints
- Some sectors are mainly electricity users and have no control over the carbon intensity of the electricity they purchase
- Made early moves in 2000 to switch from fuel oil to natural gas for power generation; currently at 95% natural gas
- Next step - focus on energy efficiency

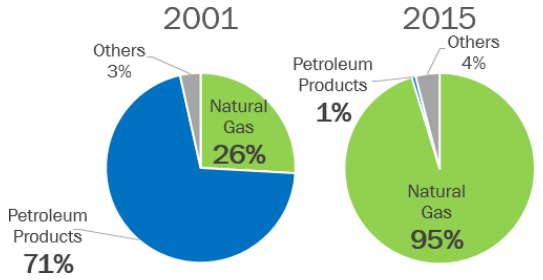
Low Wind Speeds



No large river systems

Lack of conventional geothermal resources

Nuclear energy technologies not yet suitable for deployment in Singapore



Learning from Other Carbon Pricing Jurisdictions

Studying different carbon pricing schemes

- Understand the policy considerations and rationale behind design details
  - Evaluate the context to decide what makes most sense for us

- Adopt the best practices, learn from others' experiences
  - Balance between policy objectives and complexity
  - E.g. took reference from Japan's Energy Conservation Act in developing our own Act

- Actively keeping up with international developments and engage international community

- Need to better understand not just the explicit carbon prices, but implicit cost of carbon and energy policies e.g. regulations, standards, renewable energy targets, energy efficiency targets and voluntary agreements

Working Closely with Companies to Overcome Challenges

Collaborative Approach

- Energy Efficiency National Partnership (2010)
  - Promote energy management systems
  - Learning network for sharing of ideas, technology, practices, standards and case studies
  - National recognition scheme (EENP awards)

- Technology roadmaps/primers

https://www.nccs.gov.sg/resources/technology-roadmaps

ENERGY EFFICIENCY NATIONAL PARTNERSHIP **2016**

Award Categories	Award Recipients
Excellence in Energy Management	1. German Centre for Industry & Trade Pte Ltd 2. Molex Singapore Pte Ltd 3. Singapore Management University
Best Practices	1. Asia Pacific Breweries (Singapore) Pte Ltd 2. ExxonMobil Asia Pacific Pte Ltd 3. Lucite International Singapore Pte Ltd
Best Practices (Honourable Mention)	1. ExxonMobil Asia Pacific Pte Ltd 2. GlobalFoundries Singapore Pte Ltd & Edwards Technologies Singapore 3. Keppel Shipyard Limited 4. LHT Holding Limited 5. Molex Singapore Pte Ltd
Outstanding Energy Manager of the Year	1. Mr Eric Leung – ASM Technology Singapore 2. Mr Mohamed Shahril Bin Jaffar – Panasonic Appliances Refrigeration Devices Singapore
Best Energy Efficiency Practices in the Public Sector (Large Building)	1. Ministry of Manpower 2. National Institute of Education
Best Energy Efficiency Practices in the Public Sector (School)	1. St Andrew's Junior College

*Best practices award recipients collectively realise 900TJ in energy savings per year

More details at www.e2singapore.gov.sg/programmes/energy_efficiency_national_partnership.aspx

Working Closely with Companies to Overcome Challenges

Collaborative Approach

- Getting new investments to be as energy efficient as possible e.g. 1st quartile
  - Important to get it right from the start to avoid costly retrofits
  - Energy Efficiency Fund co-funds of up to 50% of qualifying costs for resource efficiency design for new facilities
- Helping existing facilities to improve in energy efficiency levels
  - Co-funding of up to 50% of qualifying costs for energy assessments for existing facilities
  - Co-funding of up to 30% of qualifying costs of energy efficiency projects e.g. manpower, equipment, materials, professional services
- Carbon tax revenue will be used to help industry reduce their emissions

More details at www.e2singapore.gov.sg/incentives/energy_efficiency_fund.aspx

Working Closely with Companies to Overcome Challenges

Energy Efficiency Success Stories

Asia Pacific Breweries Singapore

Project description

In 2011, APBS invested US$0.7 million to install a waste heat recovery system to recover waste heat from its wort boiling process. The heat recovered from the water vapour generated during the wort boiling process, in a return cycle pre-heats the wort in a wort heater. The excess heat siphoned, in turn, produces hot water which is then used for general cleaning.

Waste Heat Recovery System

Wort Heater

Results

By recovering and repurposing the emitted heat, this project yields APBS an annual energy savings of 12,000,000MJ, which by current day's utility costs, averages to approximately US$140,000

Glaxo Wellcome Manufacturing

Project description & results

To improve the energy efficiency of its facility, GSK Bio replaced the two existing boilers with two higher efficiency 5 tonnes/hour boilers, and installed a tri-generation plant at an investment cost of US$4.8 million. The integrated system comprising smaller boilers and the tri-generation plant met part of GSK Bio's electricity, steam and chilled water requirements, and its entire hot water requirement. As a result, GSK Bio reduced its energy cost by 20% at the facility level and achieved an annual savings of about US$1 million or 35.8TJ of energy. The following pictures show the new boilers and tri-generation system.

New 5 tonnes/ hour boilers

Heat recovery steam generator of tri-generation system (left) and absorption chiller

Working Closely with Companies to Overcome Challenges

Consultations on carbon pricing, design and implementation

- Public consultation document on Singapore's carbon strategy, role of carbon pricing

- In-depth consultations with industry stakeholders
  - 1-on-1 bilateral consultations, sector group sessions, engagements with industry associations
  - Multiple sessions, multiple tracks to cover all key issues
    - Mechanism design
    - Measurement, Reporting, Verification
    - Carbon leakage and competitiveness concerns

- Consultations on draft carbon pricing legislation

More details at https://www.nccs.gov.sg/public-consultation

Working Closely with Companies to Overcome Challenges

Learning by doing

- We do not have the perfect solutions to all the challenges yet, and will continue to discover more challenges; continuous learning and adaptation

- Step-by-step approach

  – Start Measurement & Reporting early to build up MRV infrastructure -> Enhancements of Measurement and Reporting under the Energy Conservation Act for third party verification

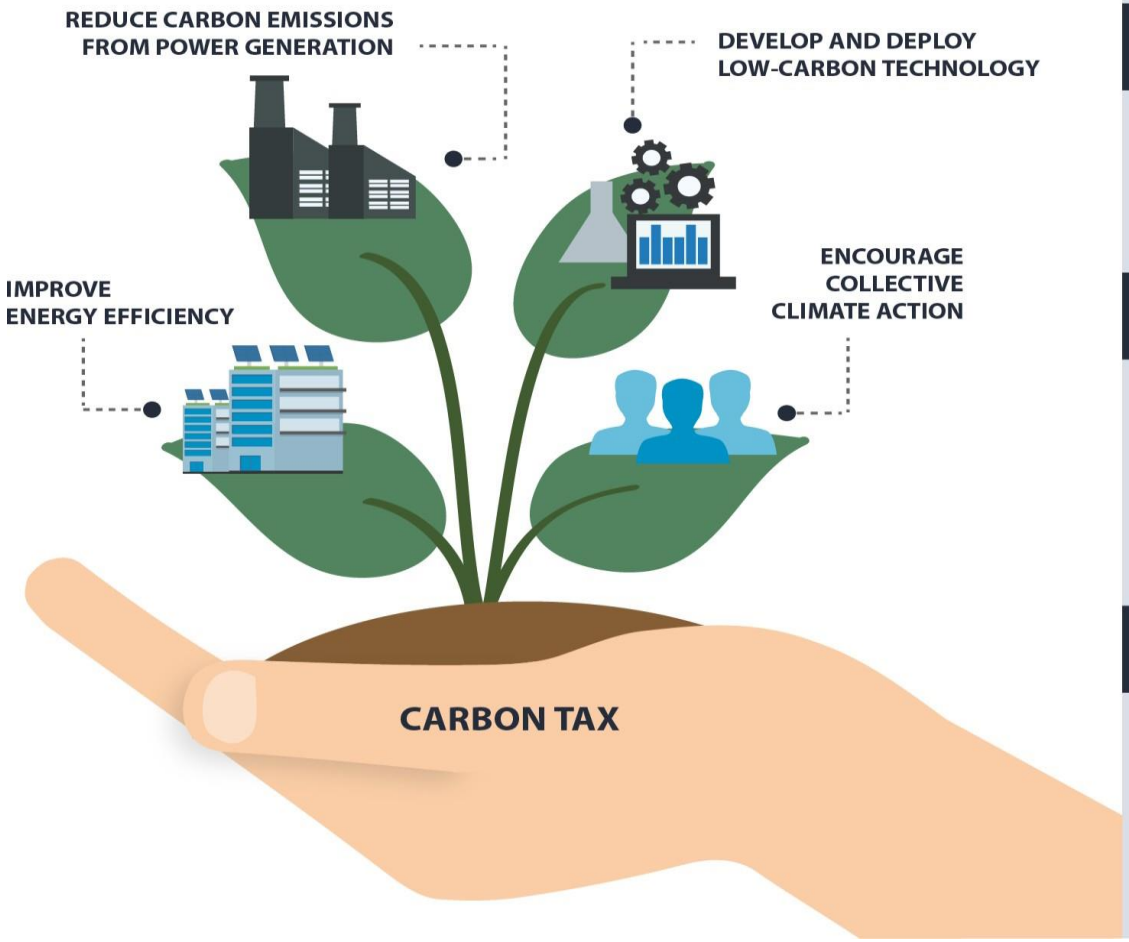
  – From fostering sharing of industry best practices -> co-developing detailed technology roadmaps -> co-funding industry energy efficiency improvement

  – Socialise what carbon pricing is -> need for carbon pricing -> what role carbon pricing could play in Singapore's climate change strategy

  – Carbon price supports and complements other measures in our climate action plan

Singapore's Climate Change Mitigation Strategy

SINGAPORE'S CLIMATE ACTION PLAN



HOW A CARBON TAX WORKS

1 INTRODUCE A TAX ON EMISSIONS

- Carbon tax will generally be applied upstream, for example, on power stations and other large direct emitters.
- Businesses can choose to reduce emissions or pay a carbon tax.

2 ENCOURAGE ENERGY EFFICIENCY & SUPPORT MORE GREEN ACTIONS

- Businesses are motivated to improve their energy efficiency.
- Consumers are encouraged to use less electricity and save energy.
- Carbon tax revenue will help to fund measures by industry to reduce emissions and provide appropriate measures to ease the transition.

3 LOWER CARBON, GREENER ECONOMY

- Lower emissions lead to a greener planet.
- Businesses become more resource-efficient and sustainable.
- More opportunities in green growth sectors, such as clean technology.

THANK YOU