Low-Carbon Technologies for MSMEs in Singapore

Energy Studies Institute, National University of Singapore
Foon Lee Leow and Alvin Wei Liang Ee

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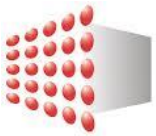
Metro Manila



ENERGY STUDIES INSTITUTE

NUS National University of Singapore

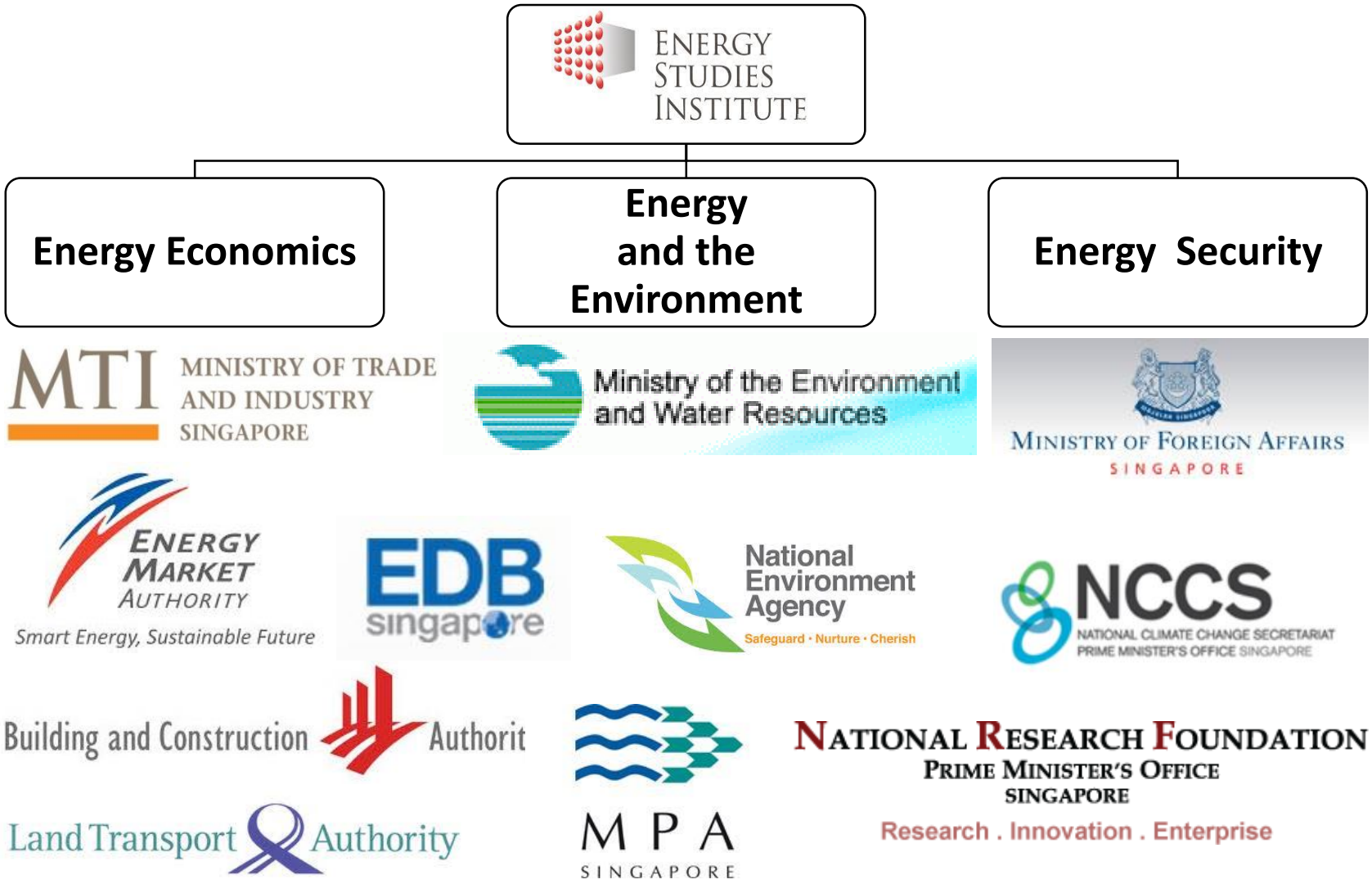
Singapore

About Energy Studies Institute (ESI)

- Established at the National University of Singapore in November 2007
- Committed to providing independent, objective, quality and timely policy research and analysis of regional and global energy trends
- Focal point for NUS's accreditation to UN Framework Convention on Climate Change
- Consistently ranked among the top energy and resource policy think tanks in the Global Go To Think Tank Index Report

Research Divisions and Stakeholders

Singapore



Singapore

Introduction - Overall

- Urban city-state of just 719.9km²
- Tropical climate on equator
- Low-lying, gentle topography
- Highest point 164m
- Population: 5.64 million in June 2018
- Population density: ~7,796 persons/km²
- Nominal GDP: S$491 billion in 2018
- Per capita GDP: S$87,108 in 2018
- Contribution to global emissions: 46,831.68 gigagram CO2-equivalent, 0.11% of global emissions (2010)
- Per capita emissions: 26th out of 142 countries based on IEA 2015 data
- Renewable disadvantage country

Structure of 2018 Economy (Nominal Value- added, % Share)	
Total	100.0
Goods Producing Industries	26.1
Manufacturing	21.4
Construction	3.5
Utilities	1.2
Other goods Industries	0.0
Service Producing Industries	70.4
Wholesales & Retail Trade	18.0
Transportation & Storage	6.9
Accommodation & Food service	2.1
Information & Communication	4.1
Finance & Insurance	12.9
Other Service Industries	11.5
Ownership of Dwellings	3.4

(Source: MTI, Economic Survey of Singapore,2019)

Introduction

Singapore's Paris Agreement Climate Pledge

- Reduce Emission Intensity (GHG per S$GDP) by 36% from 2005 level by 2030 and stabilize emissions with the aim of peaking around 2030

On 22 April 2016, Minister for Foreign Affairs Vivian Balakrishnan **signed the Paris Agreement** at the United Nations

- Baseline at 175.7 tCO_2/S$million GDP
- Target: 114.2 tCO_2/S$million GDP

Introduction

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Inter-Ministerial Committee on Climate Change

MOF Ministry of Finance Singapore · Ministry of Foreign Affairs Singapore · MND Singapore · Ministry of the Environment and Water Resources · MTI Ministry of Trade and Industry Singapore · Ministry of Transport Singapore · NCCS National Climate Change Secretariat, Prime Minister's Office Singapore

Building and Construction Authority · CAAS Civil Aviation Authority of Singapore · EDB Singapore · Energy Market Authority · iDA · IE Singapore · jtc · Land Transport Authority "We Keep Your World Moving"

MPA Singapore · National Environment Agency · National Parks · National Research Foundation Prime Minister's Office Singapore Research . Innovation . Enterprise · PUB · SPRING Singapore Enabling Enterprise · Urban Redevelopment Authority

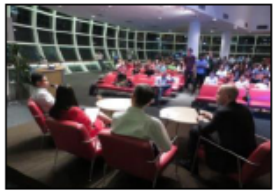
Energy System Modelling

NUS National University of Singapore · Energy Studies Institute

Energy Efficiency Studies

- Economy-wide
- Industrial Sector

McKinsey&Company · ICF International



Public Consultation

- Online Consultation
- Stakeholder/Sectoral Consultations

Energy Tech Roadmaps

2012 · 2013 · 2014 · 2015 → Singapore's INDC Submission

Inter-agency technical analysis under IMCCC

(Source: National Climate Change Secretariat, Singapore)

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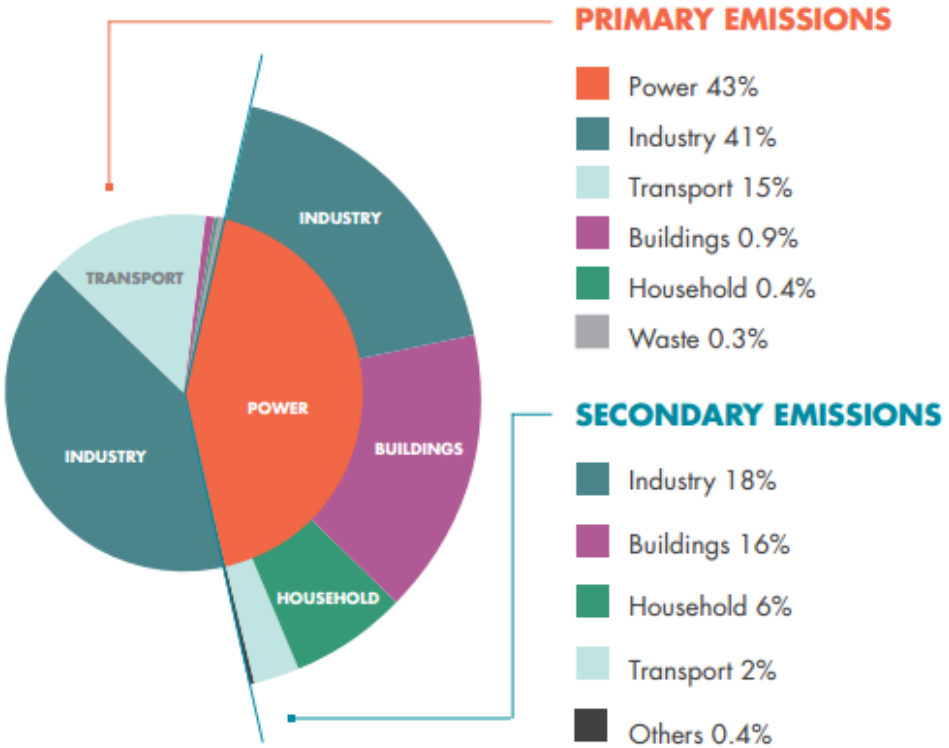
Introduction

Emissions by IPCC Sector (2012)



(Source: Climate Action Plan 2016, Third Biennial Update Report, 2018)

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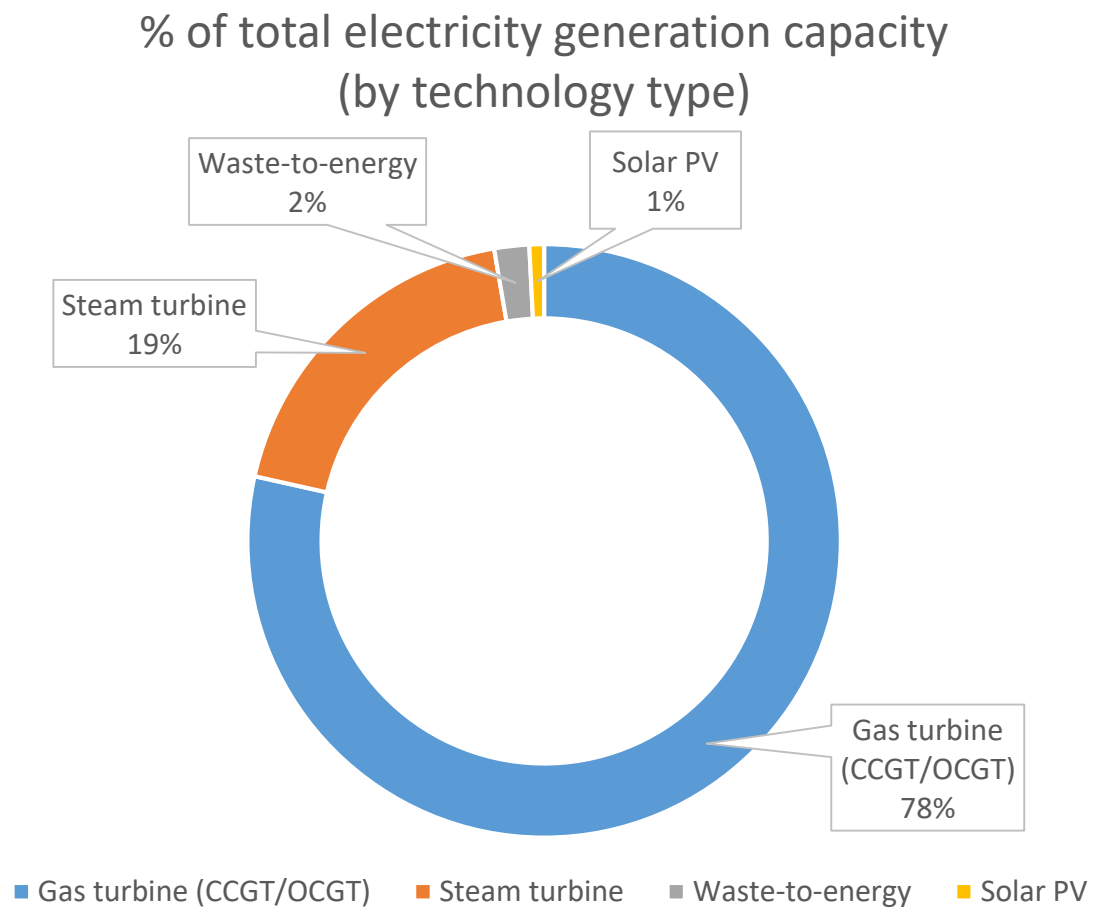
Introduction – Power generation



(Source: EMA, Electricity Generation Capacity by Generator, 2019)

Singapore

Mitigation Measures Across All Sectors





Industry

- Adopt cleaner fuels
- Reduce non-CO_2 GHG
- **Improve energy efficiency**

Buildings

- **Green Mark Certification for 80% of buildings by 2030**
- **Improve energy efficiency of building tenants**

Transport

- Increase public transport share to 75% by 2030
- **Improve fuel efficiency of private vehicles**
- Test-bed electric vehicles

Households

- **Mandatory Energy Labelling Scheme (MELS)**
- **Minimum Energy Performance Standards (MEPS)**
- **Smart home technologies**

Waste and water

- **Improve efficiency of desalination and used water treatment**
- Increase overall recycling rate
- Reduce plastics incineration

Power generation

- **Adopt more efficient technologies**
- Increase deployment of solar PVs

Carbon Tax

- Complements and enhances effectiveness of other mitigation measures

Singapore

MSME Profile

MSME Classifications in Singapore

- Operating receipts not more than S$100mil or
- Employment not more than 200 workers

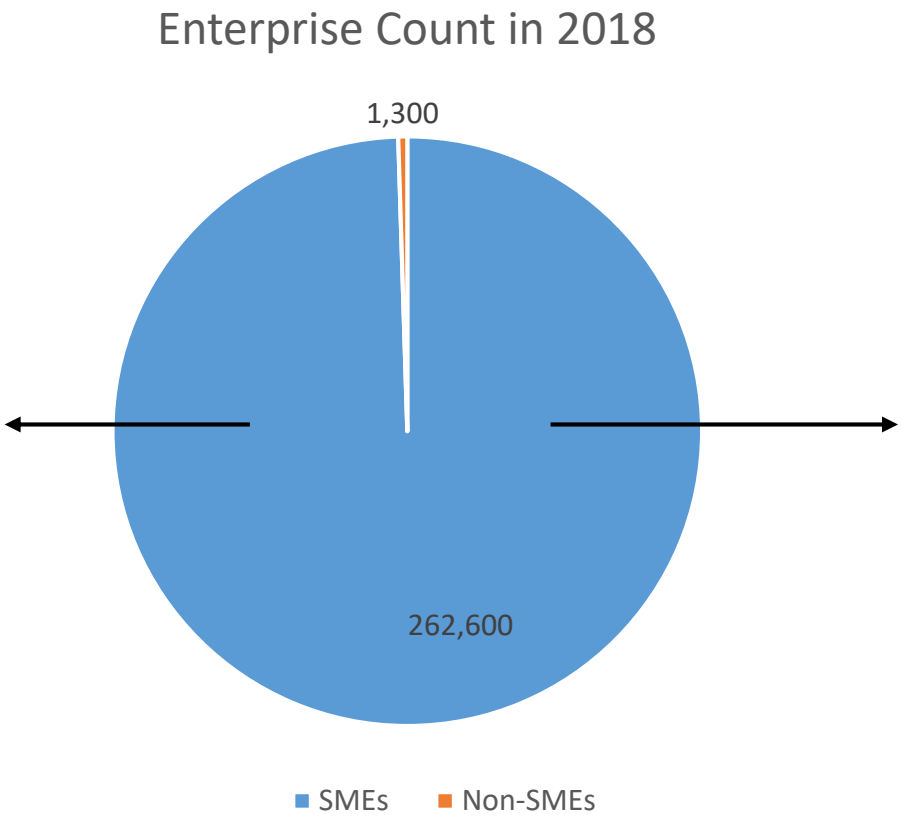
- Does not further sub-divide SMEs to
  - Micro
  - Small
  - Medium

Singapore

MSME Profile

Distribution by Number

4 key industries:
1. Food and Beverage
2. Info-comm
3. Retail
4. Manufacturing



SMEs accounts for more than 99% of total enterprises in Singapore

(Source: SingStat, Topline Estimates For All Enterprises And SMEs, Annual, 2019)

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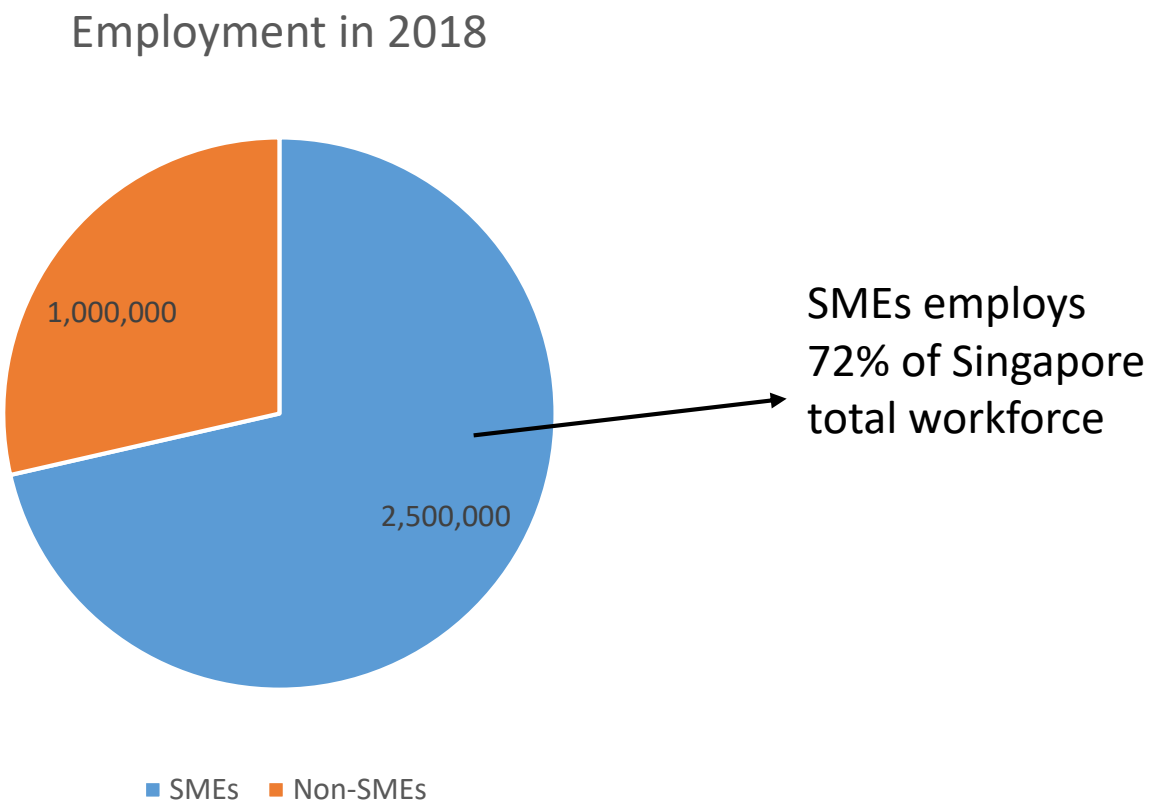
MSME Profile

Distribution by Employment



(Source: SingStat, Topline Estimates For All Enterprises And SMEs, Annual, 2019)

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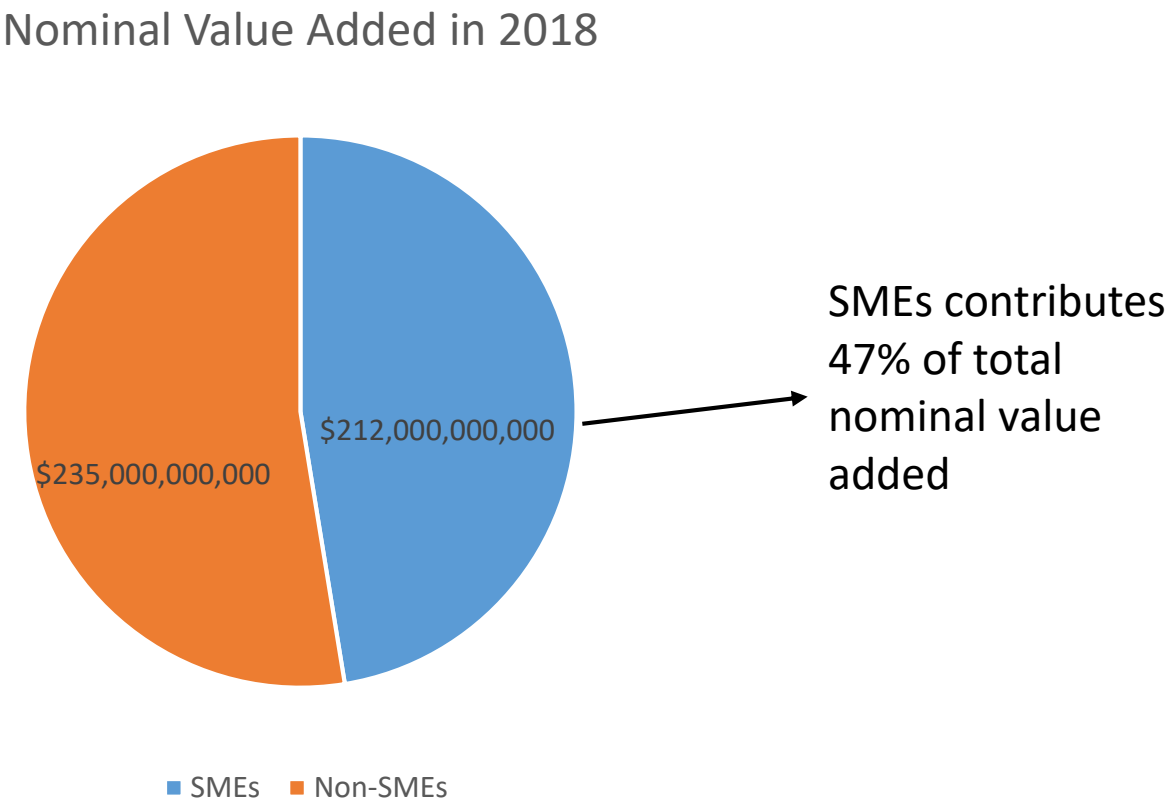
MSME Profile

Distribution by Nominal Value added



(Source: SingStat, Topline Estimates For All Enterprises And SMEs, Annual, 2019)

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MSME Profile - Placement

(Source: Google map,2019)

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MSME Profile - facilities

Gas supply
(Piped/tanked)

Emissions

HVAC
(self)

or

HVAC
(Facilities)

Processes

In-house
waste
treatment

National Water supply

National Power Grid

Waste-treatment plant

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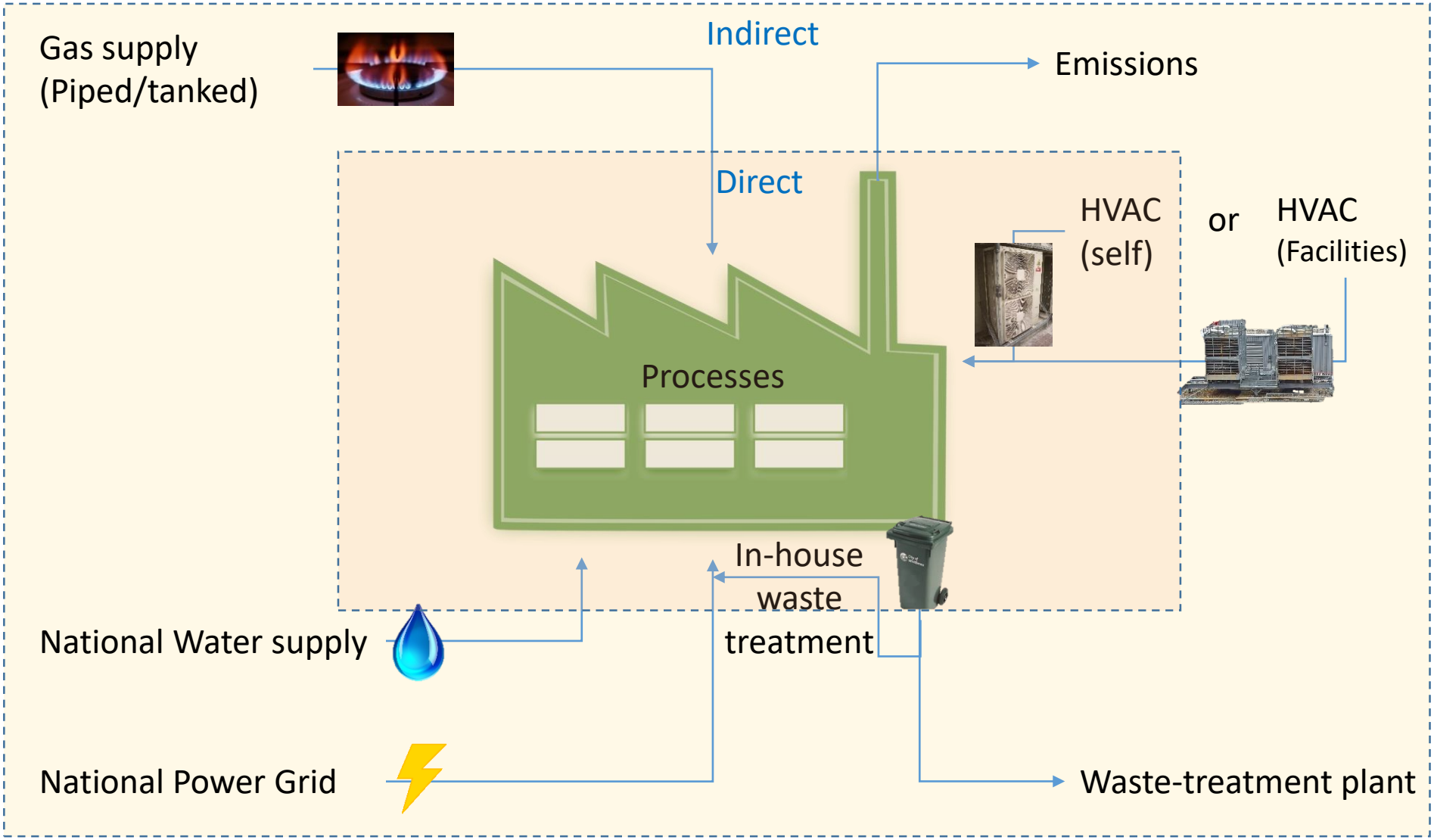
MSME Profile - facilities



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MSME Policies

Latest Country Framework Plan

- Carbon Tax
- Access to Markets
- Access to Finance
- Low Carbon, Energy Efficiency & Renewable Energy Related Support Program for MSMEs

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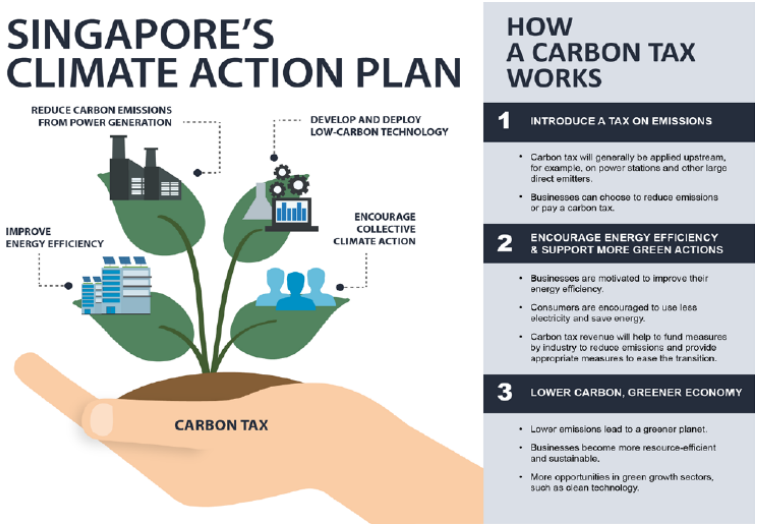
MSME Policies

Latest Country Framework Plan – Carbon Tax

Singapore have introduced carbon tax in 2019

- Covers six greenhouse gases
  - Carbon dioxide (CO_2)
  - methane (CH_4)
  - Nitrous oxide (N_2O)
  - Hydrofluorocarbons (HFCs)
  - Perfluorocarbons (PFCs)
  - Sulphur hexafluoride (SF_6)
- Fixed price credit-based system



(Source: NCCS, How A Carbon Tax Works, 2017)

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MSME Policies

Latest Country Framework Plan – Carbon Tax

- S$5 per ton from Year 2019 to 2023
  - Expected revenue from tax: S$1 Billion in 5 years
  - Intention to raise to S$10-S$15 by 2030
- For direct emissions
  - companies emitting >25,000 tCO_{2eq} annually will be taxed on 100% of their emissions.
- Applied upstream - e.g. power plants
  - Increase operating costs for MSMEs
    (Introduction of carbon tax is equivalent to 6-12% increase in current oil prices)
- Revenue from the tax will help to fund measures by industries to reduce emissions

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MSME Policies

Latest Country Framework Plan – Access to market

- MSMEs focus on 4 main sectors
  - F&B
  - Info-communication
  - Retail
  - Manufacturing

Service

- Mainly focus on domestic market except Manufacturing
  - Expansion to overseas expand MSMEs market

MSME Policies

Latest Country Framework Plan – Access to market

- Financial supports/incentives are available to encourage overseas expansion by:
  - Economic Development Board
  - Enterprise Singapore

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MSME Policies

Latest Country Framework Plan – Access to market

Market Readiness Assistance Grant (MRA)

Funds up to 70% overseas market set up,
market promotions and identification of overseas business partner

Enterprise Development Grant (EDG)

Fund up to 70% for consultancy fees, software and equipment as well as
manpower cost

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MSME policies

Latest Country Framework Plan – Access to finance

BCA: Building Retrofit Energy Efficiency Financing

Up to 90% loan (capped at $4 million) for purchasing/installation of :

- Energy efficient equipment
- Renewable energy systems

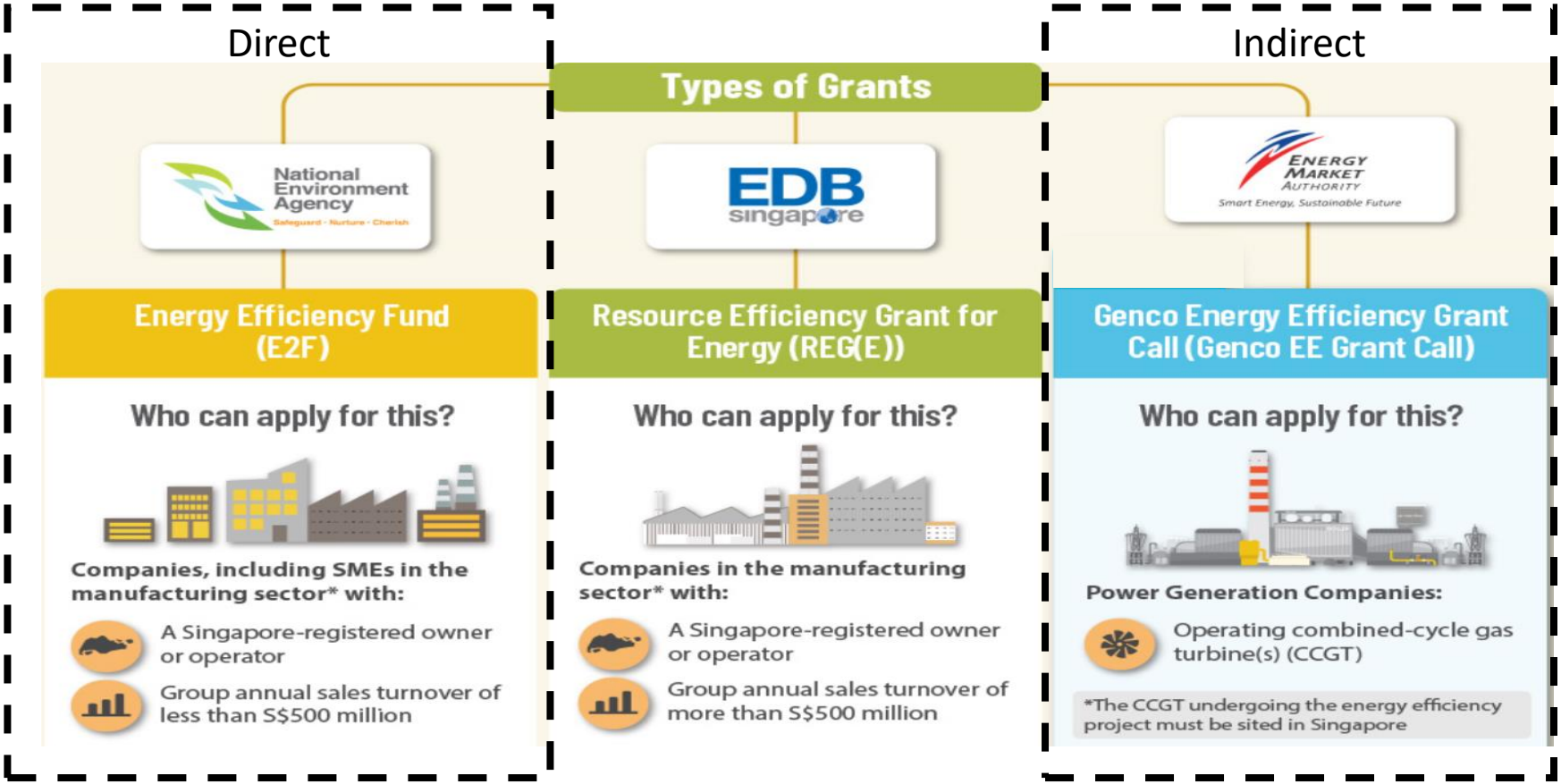
EDB/SDCL: Energy Efficiency Financing (Pilot)

3rd party financing up to 100% of cost of EE improvement projects

Companies are not required to pay for the upfront cost, repayment through energy saving

MSME policies

Latest Country Framework Plan – Finance (Grants)



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MSME policies

Latest Country Framework Plan – Finance (Grants)

Energy Efficiency Fund

Funds up to 50% of qualifying cost, capped at S$600,000 for:

- Resource efficient design of new facilities/major expansion
- Energy assessment of existing facilities
- Adoption of Energy efficient Equipment technologies

GENCO Energy Efficiency grant call

Launched in October 2018 during Singapore International Energy Week

Co-fund up to 50% EE projects by power generation companies over the next 5 years

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MSME policies

Latest Country Framework Plan – Support Program for MSMEs

Centers of Innovations

- Develop and test new technologies
- Consultancy/training

Tech access and collaborations with local IHLs

- R&D
- Problem solving

Trainings

Training grant for Energy related courses for (MSMES & Individual) such as:

- ISO 5001
- Singapore Certified Energy Manager
- Energy Efficient Opportunities Assessor

Energy Efficiency & Renewable Energy Applications for MSMEs Best Practices

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Examples - EE (Direct)

Replacement of lighting

- Replace 67 metal halide high lamps and 8 high pressure sodium lamps with LED lamps
- Result in 53% reduction in lighting energy consumption
- Saving of S$3,300 per year (22 MWh)

Retrofitting of chiller plant

- Replacement of inefficient chiller with more efficient system
- Increase efficiency by 38%
- Saving of S$324,000 per year (2,200 MWh)

Energy Efficiency & Renewable Energy Applications for MSMEs Best Practices

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Renewable Energy Application – Indirect

- Total Solar power capacity: 226.4 MWp (130 MW)
  - Residential: 9.7 MWp
  - Non-residential: 226.4 MWp
    - Private sector: 114.3 MWp
- Total solar power capacity increases
  - 1,110% from 2014 (5 years)
  - 56,500% from 2009 (10 years)

Energy Efficiency & Renewable Energy Applications for MSMEs Best Practices

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Renewable Energy Application - Indirect

- 350 MW by yr 2020, 1 GW beyond yr 2020
  - Due to land area constraint, floating PV cells will be deployed in local reservoir

(Source: Straits Time, Tengeh Reservoir to house one of world's largest floating solar panel systems, 2019)

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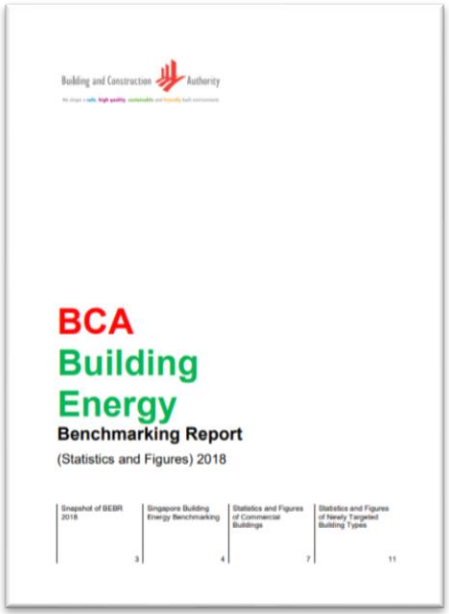
MSME Needs Analysis

Intervention Needed to improve MSME Energy Utilization Management

- Monitoring to provide baseline comparison for different product types
- Carbon/eco labelling



Conclusion

- Regulatory, financial and other supports are available for MSME to adoption of low carbon technologies.
- As policies/support were recently rolled out, limited information is available to determine the success of each policies.
- Capacity and competitiveness of MSME in Singapore still requires strengthening
- Learning replicable strategies

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Thank you