What lies ahead for Singapore’s industrial energy efficiency landscape? Scaling up the market with innovative solutions

HU Huijun
Research Associate, ESI/NUS

EEAP Evaluation 2019 Conference
Bangkok, Thailand
30 October 2019
Overview

- About Singapore
- Singapore’s Industrial Energy Efficiency Landscape
  - Singapore’s Industrial Sector
  - Existing Mitigation Measures
  - Key Challenges in driving Industrial Energy Efficiency
- What lies ahead?
Singapore

- **About Singapore**
  - Nominal GDP: S$491 billion in 2018
  - Per capita GDP: S$87,108 in 2018
  - Contribution to 0.11% of global emissions
  - Per capita emissions: 27th of 142 countries based on IEA 2018 data.
  - Carbon Intensity (Emissions per $GDP): 126th of 142 countries based on IEA 2018 data.
  - Renewable disadvantage country

  “Everything else must bend at the knee to safeguard the existence of our island nation”
  
  – Prime Minister Lee Hsien Loong, NDR 2019

- **Singapore’s 2030 pledge (Intended Nationally Determined Contribution, 2015)**
  - To reduce Emissions Intensity by 36% from 2005 levels by 2030 (0.176 → 0.113 kgCO2e/S$GDP), and stabilize our GHG emissions with the aim of peaking around 2030

Singapore’s Industrial Sector

2016 GDP: S$410 billion (US$290 billion)

- Wholesale & Retail Trade: 14%
- Construction: 5%
- Transport & Storage: 8%
- Business Services: 16%
- Financial Services: 13%
- Manufacturing: 20%
- Others: 25%

Energy and Chemicals accounted for 24.9% of our S$256 billion manufacturing output in 2016

2016 GDP growth: 1.8%
2017 GDP growth forecast: 1.0% to 3.0%

Source: Singapore Ministry of Trade and Industry

Source: EDB, Productivity Improvement Workshop 2017
• Final energy consumption increased by **23.7%** (8.0 → 9.9 Mtoe) in the industrial sector of Singapore between 2010-17.

![Energy Consumption Chart](chart.png)

By 2018, the industrial sector contributed to **60%** of GHG emissions (Tanoto, 2018).

• Energy Efficiency Policy targeted at improving industrial energy efficiency, within the context of an open trade-oriented economy.
  - In 2016, the state announced its goal under the Climate Action Plan to improve the manufacturing sector’s energy efficiency at rates of **1-2 %** yearly between 2020 and 2030.

Source: EMA, Energy Snapshot of Singapore 2019
Existing Mitigation Measures

- Energy Conservation Act (2012)
- Carbon Tax (2019)

- Resource Efficiency Grant for Energy (REG(E)) (2019)
- Investment Allowance (2015)
- Energy Efficiency (EE) Financing (2013)

- Singapore Certified Energy Manager (SCEM) Programme
- Energy Services Companies (ESCO) accreditation (2005)

Source: Joash Seng, Senior Lead (EDB) / Leow Beng Kwang, Senior Manager (NEA)
Carbon Tax

• **Fixed Price Credit Based (FPCB) system:** Single uniform carbon price of S$5 from 2019-2023.
  - Tax will be reviewed with intention to increase it to between S$10 – 15/tCO2e by 2030.

• **Targeted at direct emissions:** Companies emitting >25,000 tCO2e annually will be taxed on 100% of their emissions.

• **Covers 6 GHGs:** carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and Sulphur hexafluoride (SF6)

• **Applied upstream:** 30 – 40 large emitters which account for about 80% of Singapore’s GHG emissions.

• **Revenue from carbon tax will provide grants and incentives** to help businesses reduce their emissions and become more energy and carbon efficient.

Energy Efficiency Financing (Pilot)

- Pilot Scheme with Sustainable Development Capital LLP (SDCL) to provide 3rd party financing for up to 100% of upfront cost for EE improvement projects – i.e. Companies are not required to pay for upfront costs, but repay through energy savings.

- EDB supports via partial credit guarantee agreements with PFIs.

- Financing provided can potentially cover equipment, labor, installation costs, as well as the cost of measurement and verification of the energy savings resulting from energy-efficiency projects implemented.

- Case Study: Panasonic’s replacement of air compressors
  - Challenges of ECO program: Lack of budget, ROI too long, lack of expertise in energy efficiency, high investment, other priorities
  - Air compressor system consume 28% of electricity (aged, inefficient)
  - Retrofit resulted in 22.6% energy improvement.
Capability Development for Energy Efficiency

- **Energy Efficiency National Partnership**
  - Promotes adoption of Energy Management Systems in partner companies
  - Provides partners with opportunities to learn and share energy efficiency ideas, strategies, technologies, best practices, standards and case studies
  - Accords recognition to companies through annual EENP Awards
  - As of 30 Sep 2019, a total of 291 companies have joined as Partners, including 3M, Asia Pacific Breweries, BASF and Hitachi Chemical

- **ESCO Accreditation Scheme**
  - Enhances the professionalism and quality of services offered by ESCOs
  - 19 accredited ESCOs (e.g. Honeywell, Johnson Controls and G-Energy) and 31 Qualified Energy Services Specialist (QuESS)
What lies ahead for Singapore’s Industrial Energy Efficiency?

- Building on **existing programs**, *e.g.* **EE Financing Pilot**
- ESI is studying **financial** (e.g. publicly funded loans or grants/subsidies) or **market-based instruments** (MBIs: auctions, tenders, white certificate and obligation programs) which help to deliver a price signal to provide incentive for firms to invest in innovation or implement more energy-efficient technologies, and deliver energy savings whilst minimizing costs.
HU Huijun  
Research Associate, ESI/NUS  
Email: esihui@nus.edu.sg

http://www.esi.nus.edu.sg

Energy Studies Institute  
National University of Singapore

29 Heng Mui Keng Terrace  
Block A, #10-01  
Singapore 119620