

Regional Dialogue on Technology Facilitation for Sustainable Development

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The Case of Hong Kong SAR, China

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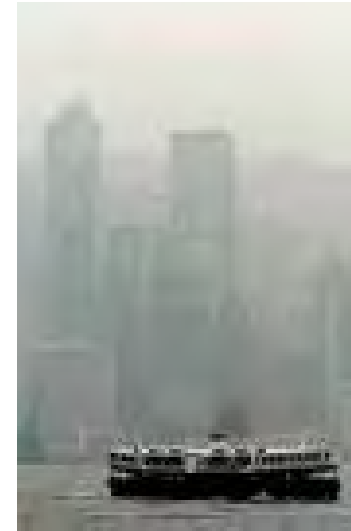
The Case of Hong Kong – Seeking sustainability in a highly dense city

- Hong Kong has been a special administrative region (HKSAR) of China since 1997 and is positioned as the international financial centre for China and in Asia
- HKSAR's proximity to the Pearl River Delta has the advantage as one of the fastest economic development regions of the world.
- A highly dense Asian city of population closed to 7 million within a limited area of 1,067 sq km



The Case of Hong Kong

- **Air quality** of the city has continued to deteriorate in the last decade.
- Threatening its recently positioned role as the international financial centre in Asia
- **Adverse impact on the health of people** residing in this international city.
- Its **environmental sustainability** can be viewed as highly challenging to this highly dense city
- Its experience would be of relevant reference to other Asian counterparts.



The Case of Hong Kong

- **Two major sources of local air pollutants:**
 - GHG emission from **power generation** within HKSAR using fossils
 - **Vehicular emissions**
- **Set objectives to reduce GHG emission from these two major sources**
- **Progress so far**
 - Electricity consumption:
 - Reduction in consumption thru improving energy efficiency
 - Fuel sourcing from coal to natural gas for power plants
 - However, still very little use of renewables
 - Vehicles
 - Higher standards for fossil fuel consumption (EU standard/technology)
 - More public transportation (MTR)
 - Importation of electric cars and development of charging stations

Key Constraints in Adoption of Clean Tech

Education and engagement about sustainable development	Alignment of stakeholders' economic interests	Absorption capacity* for technological solutions
<ul style="list-style-type: none"> ▪ Education about sustainable development ▪ Knowledge about climate change ▪ Public engagement about values, preference and beliefs ▪ Consensus about common goals 	<ul style="list-style-type: none"> ▪ Incentives in energy policy for renewable energy generation ▪ Integrative policy to induce support among stakeholders ▪ Commitment to capital investments for renewal of technological infrastructure ▪ Cost effectiveness of solutions 	<ul style="list-style-type: none"> ▪ Knowledge/technology transfer ▪ Design of customized solutions in a highly populated and condensed city ▪ R&D for product localization ▪ Training and development of relevant human capital for operations

Ng and Nathwani (2010)

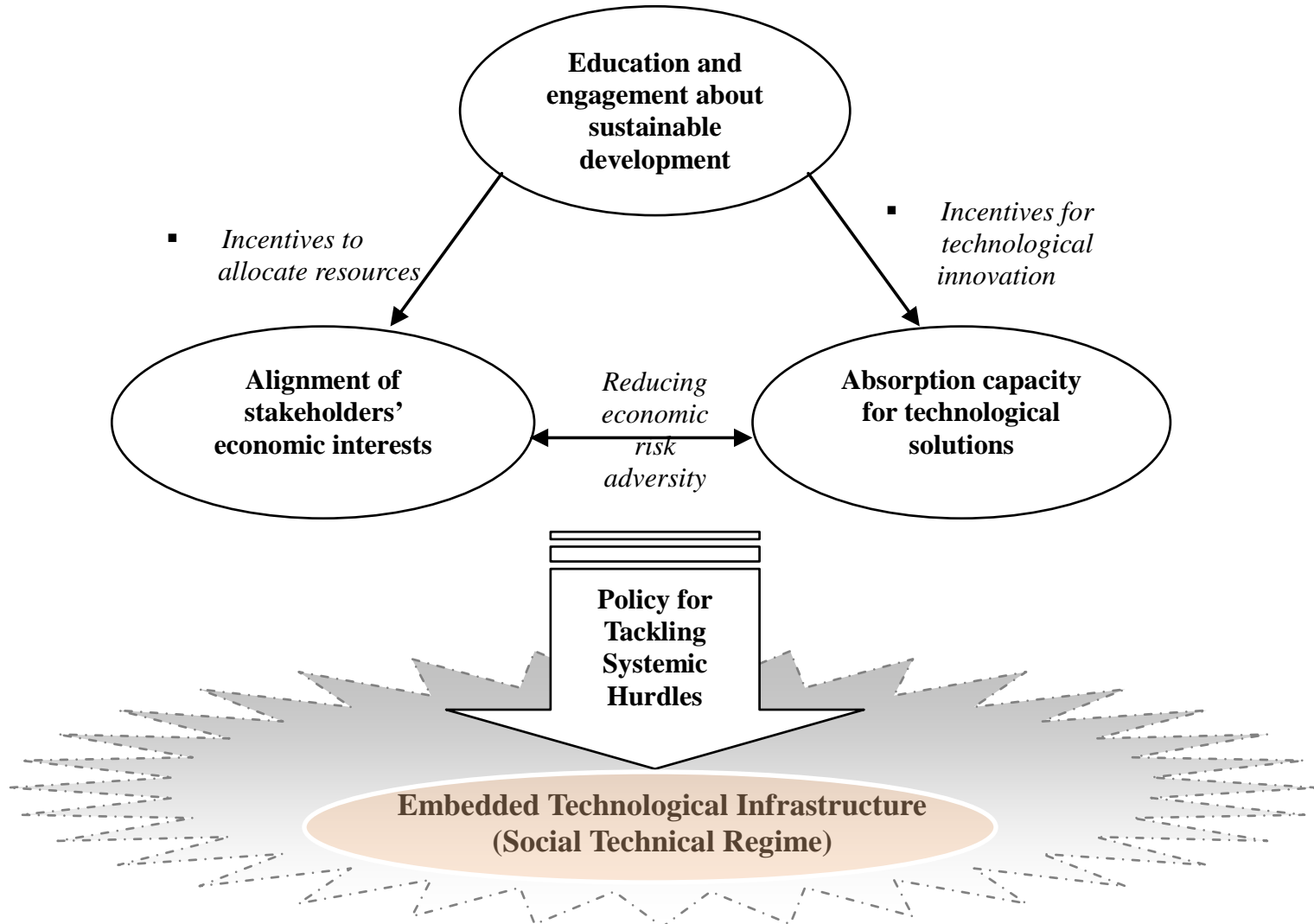
Table 1 Key Constraints for Technology Niche**

Notes:

*This refers to the ability of a society to “recognize the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovative capabilities” as conceptualized by Cohen and Levinthal (1990).

**Constraints as summarized in a prior study about backcasting framework for renewable energy sector of China by Ng (2009).

Inducing Policy for Tackling Systemic Hurdles



Embedded Technological Infrastructure

- **Technological infrastructure:** defined as system of knowledge and network embedded inside the existing system - the range of current “regimes” connected with key stakeholders (Weiss and Birnbaum, 1998)
- **Three crucial systemic hurdles** embedded within the technological infrastructure of HKSAR: **(a) the power generating system, (b) property development system and (c) the road transport system.**

Embedded Technological Infrastructure

- Electric Power -

- The power generating system of HKSAR has been regulated through the Scheme of Control (SOC), a contractual agreement between the power producer and the government
- Two electric utilities – Hong Kong Electric (HEC) and CLP Power (CLP) dominate for the power supply business in Hong Kong for their respective divided local markets
 - ranging from power generation, transmission and distribution to end-users.
- No direct competition between these two private players
- **Not feasible for new sources of power generation, such as renewable energy, to be given access to the grids controlled utilities unless such facilities were unbundled from the existing infrastructure (Lam, 2004).**

Power Generating Facility



The Lamma Power Station has a total installed capacity of 3,756MW with eight coal-fired units, five gas turbine units, one wind turbine and two combined cycle units.

A wind turbine in Lamma Island



A wind turbine in Lamma Island



The Lamma Wind Turbine is German-made with a rotor diameter of 50m and a rated power of 800kW. The wind turbine is of stall-regulated, “horizontal axis” design and is mounted up-wind.

A wind turbine in Lamma Island



The first green substation in Hong Kong



British-made windmills and 16 solar panels supply energy for utilization by the substation.

Embedded Technological Infrastructure

- Property development system -

- People inhabit in vertical building structures for living, work and social activities.
- Electricity consumed through **buildings in HKSAR has been accounted for 89% of total power consumption** according to the government.
- **Existing, restrictive land development control framework does not seem to induce appropriate incentives to innovate for a sustainable environment (Chan and Yung, 2004) .**

Mandatory Greening in Building Sites?



Building Energy Efficiency

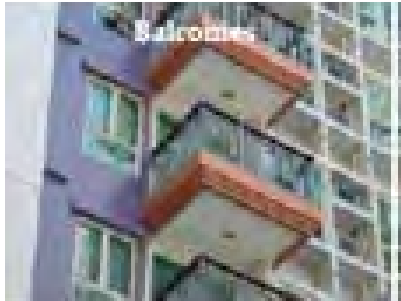
- Light pollution



- Air conditioning too cold



How to encourage greater Building Energy Efficiency?



Balconies, sky gardens

Shading Devices



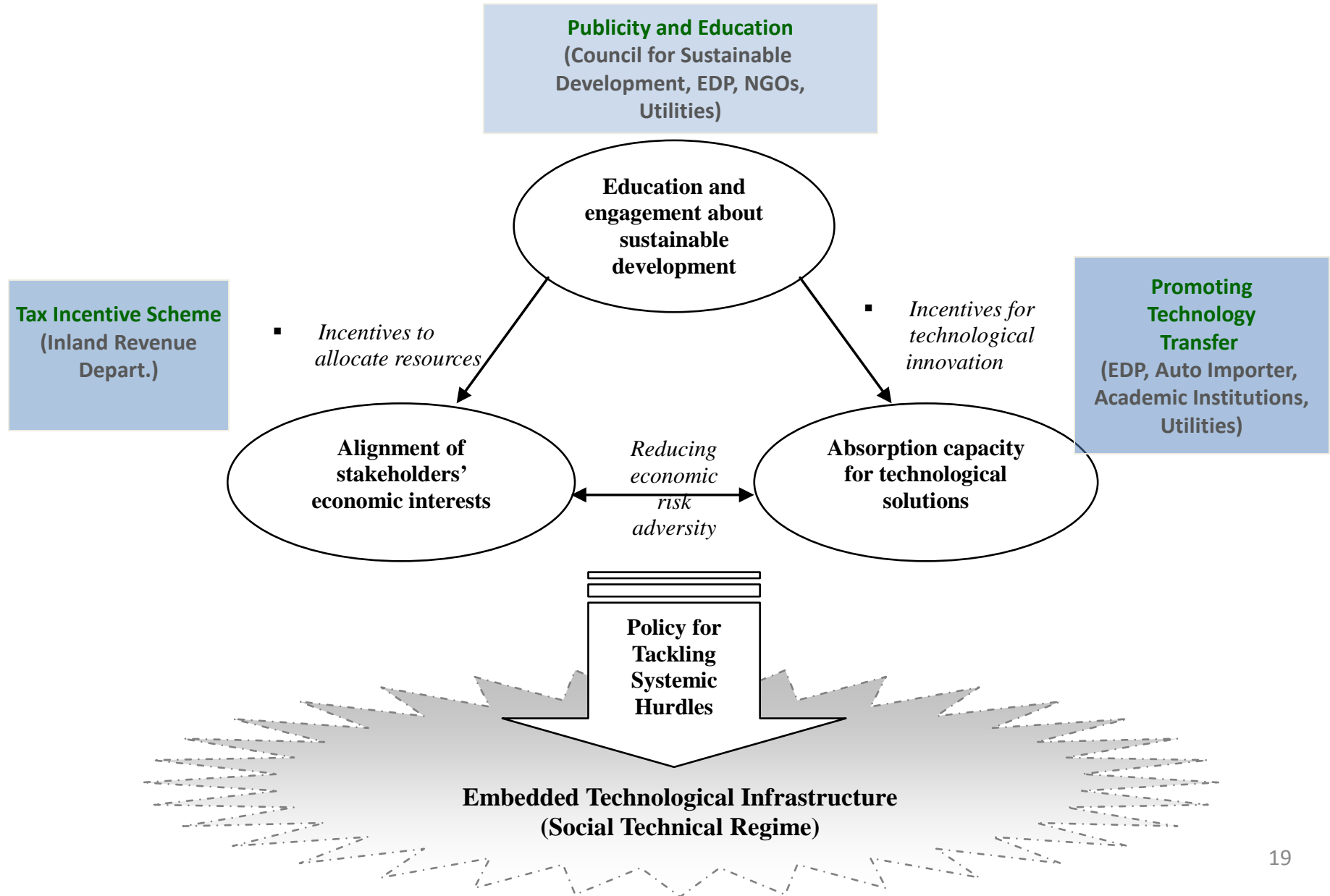
Solar Panels

Embedded Technological Infrastructure

- Road Transport System -

- A main cause to the worsening air pollution in HKSAR was the gas emissions, including NOx and volatile organic compounds (VOC), from vehicles operating in the current road transport system.
- As one of the highest densities in terms of road traffic in the world, the city has now over 500,000 licensed vehicles and about one-fourth of them use diesel fuel.
- Heavy and medium diesel vehicles running the city, including franchised buses, which may not use the best available fuel technologies to minimize their emissions.
- The problems of vehicular emissions combined with the tall building structures have caused the pollutants trapped resulting in so called “canyon effect”.

Integrated Measurers to Tackle Underlying Systemic Hurdles



Proposed Temporal Solutions

Emission Capping and Control	Transport Management/ Infrastructure Development and Planning	Energy Efficiency Measures
<ul style="list-style-type: none"> ▪ Increase ratio of natural gas in electricity generation ▪ Early retirement of aged/heavily polluting vehicles ▪ Early uptake of latest Euro standard for diesel commercial vehicles of Euro III ▪ <u>Wider use of hybrid/electrical vehicles or other environmental friendly vehicles</u> ▪ Ultra low sulphur diesel for vessels ▪ Selective catalytic reduction for vessels ▪ Electrification of aviation ground support equipment ▪ Emission control for off-road vehicles and equipment ▪ Strengthening VOC control for sealant adhesives 	<ul style="list-style-type: none"> ▪ Low emission zone for Central, Mongkok and Causeway Bay ▪ Car-free zones ▪ Bus route rationalization ▪ Expand rail network ▪ Cycling network to major public transportation hubs 	<ul style="list-style-type: none"> • Mandatory implementation of Building Energy Codes ▪ Energy efficient electrical appliances for domestic use ▪ LED for street lighting ▪ Tree planting and roof-top greening ▪ District cooling system for Kai Tal Development

Source: Proposed Phase-I measures released in March 2009 Public Forum by the Department of Environmental Protection

Electric Vehicles (EVs)

- There is no EV production in Hong Kong; all EVs are imported.
- EV suppliers may apply to the Transport Department for type approval. Once type approval is obtained and vehicle examination is passed, the EV can be registered for use in Hong Kong.
- Currently, **24 EV models imported from 7 countries** have been obtained type approval from the Transport Department.
 - 14 models of private cars/motorcycles
 - 10 models of public transport/commercial vehicles.



Promotion of Electric Vehicles

- The **Finance Secretary** chairs a [Steering Committee on the Promotion of EVs](#) with members drawn from various sectors to recommend a strategy complementary with specific measures to promote the use of EVs in Hong Kong
- A HK\$300 million [Pilot Green Transport Fund](#) has been put in place since March 2011 for application by transport operators and non-profit-making organizations, encouraging them to try out innovative green and low carbon transport technologies (including EVs).

Promotion of Electric Vehicles

Government's Measures to Promote the Use of Electric Vehicles

- First Registration Tax for EVs is waived till end March 2017. Furthermore, enterprises which procure **EVs are allowed 100% profits tax deduction for the capital expenditure** on EVs in the first year of procurement.
- The ultimate policy objective of the Government is to have zero emission buses running across the territory. To this end, the Government allocated \$180 million for franchised bus companies to purchase **36 electric buses for trial runs to assess their operational efficiency** and performance under the local conditions. The trial is expected to commence by the end of 2014.
- There are now some **1 000 standard EV chargers and about 10 quick chargers in Hong Kong.**

Collection of Fees for Charging of EV

- If car park operators are going to collect fees for the charging services for EV, they are reminded to observe the provisions of the Supply Rules of the power companies. Car park operators can contact the concerned power company for any query.



The S-Curve and R&D

