

## Summary

Environmental issues have become a key global concern and are shifting the direction of industrial policies. This shift towards more environmental friendly economic development has prompted the Singapore government to initiate the development of the clean energy sector to capitalise on the opportunities arising from it. Indeed, the Singapore economy possesses key competitive advantages in becoming a global Clean Energy Hub. By focusing on leading and progressive companies which produce products or services that stand to benefit from the development of the clean energy sector, investors may gain from this "green development".

## Climate change – a global concern

Environmental issues have become a key global concern which would demand an enormous scale of undertaking in order to rectify the problem. To date, 169 countries have ratified the Kyoto protocol in a bid to reduce emissions of carbon dioxide and five other greenhouse gases. On 12 April 2006, Singapore acceded to the Kyoto Protocol. Although it is not required to meet its greenhouse gas reduction commitment as a non-Annex 1 country, it has self-imposed a target to reduce carbon intensity (carbon dioxide per GDP) to 25% below 1990 levels by 2012.

Interestingly, according to figures from the National Environment Agency (NEA), Singapore's carbon intensity was at 0.28 kilotonnes per SGD million in 1990. That figure has declined to 0.21 in 2005, representing a 25% reduction. In other words, Singapore has already met the target of a 25% reduction in carbon intensity, seven years ahead of schedule.

However, Singapore's total carbon emissions have continued to rise along with economic growth, from 21,832 kilotonnes in 1990 to 40,377 kilotonnes in 2005. When the existing Kyoto protocol expires in 2012, the economy probably would have to impose further restriction on its carbon emissions and that will likely affect industrial policies along the way.

## Environmental issues shaping industrial policies

Looking ahead, industrial policies are likely to be shaped by the increasing concern for the environment. According to studies done by the International Energy Administration (IEA), industry and transportation sectors account for 21% and 17% of the global carbon emission respectively while the electricity generation sector accounts for the bulk, 40% of the total carbon emissions (Chart 1).

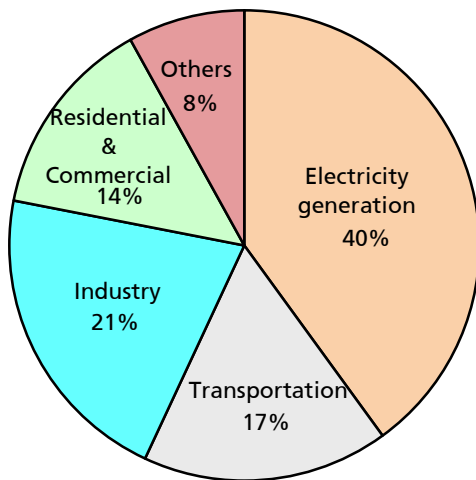
However, electricity is generated mainly to support industrial production. For example, 42% of Singapore's electricity generated in 2006 was used by the manufacturing sector (Chart 2). This implies that the percentage of carbon emissions accruing to the industrial sector would be even higher if indirect demand were taken into account. Thus, for an industrialised economy like Singapore, major industries which are critical to economic growth such as the electronics manufacturing, petroleum refining, chemical manufacturing and transportation services are all likely to be affected if there is a general shift towards more environment friendly forms of production and energy sources.

**Environmental issues have become a key global concern and are shifting the direction of industrial policies**

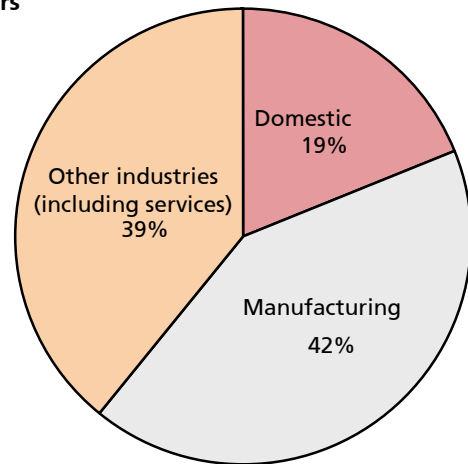
**Singapore may face further restriction on its rising carbon emission level when the existing Kyoto Protocol expires in 2012**

**All major industries which are critical to economic growth are likely to be affected**

**Chart 1: Global carbon dioxide emissions by sectors**



**Chart 2: Singapore's electricity consumption by sectors**



**A new growth engine – challenges and opportunities**

**The shift to greener policies presents opportunities along with challenges**

The shift to greener policies presents opportunities along with challenges. Apart from the fact that the global shift in environmental awareness will exert political pressure on authority in its industrial policies, there is also impetus to develop the clean/green energy sector as a new growth sector. As lower cost competitors such as China and India move up the value chain and compete more closely with Singapore in some industries, it makes economic sense to diversify and to develop an additional source of growth and jobs for the economy.

**Having a well developed clean energy sector should allow Singapore to tap on opportunities in the emerging markets such as China and India**

In addition, Singapore is a small nation without many natural resources. The bulk of the fuel necessary to power the economy is imported. Thus it is crucial for a small country like Singapore to develop alternative supplies of energy when oil reserves around the world are being depleted. Furthermore, switching to alternative clean/green energy may enhance the cost competitiveness of companies in the longer run when oil prices are most likely to rise even higher.

Fast developing economies such as China and India also offer tremendous opportunities for Singapore in the clean energy sector. Rapid economic growth in these economies are usually achieved at the expense of deterioration in the environment and high carbon emission level. But things are changing. China for example has laid out an ambitious plan to cut pollution from coal-powered energy by switching to more environmental friendly clean energy. The objective is to double the usage of energy from cleaner sources by 2020, consistent with the bid to reduce pollution before the Beijing Olympics next year and Shanghai World Expo in 2010. That means a sustained increase in demand for equipment (e.g. wind turbines, solar panels) to produce this energy as well as related consultancy services. Having a well developed clean energy sector should allow Singapore to tap on this growth market. In fact, the flagship joint venture between Singapore and China to build an “eco-city” in Tianjin should help path the way for stronger partnership in this area.

**Carbon trading offers another opportunity**

Carbon trading offers another opportunity. In Europe, carbon trading is being used to target firms such as car manufacturers and airlines in order to encourage companies to develop new technology and to reduce pollution. Quotas are first allocated to individual companies in terms of the amount of carbon emission that they may produce in the process of their businesses. Next, companies which have contributed in the reduction of carbon dioxide and other greenhouse gases as part of their business processes are awarded carbon credits (also known as Certified Emission Reductions, or CERs) under the Kyoto Protocol’s Clean Development Mechanism. As carbon credits are essentially permits to emit carbon dioxide and greenhouse gases, companies that are awarded credits may sell

them to other companies that are emitting above their quotas. Thus, the carbon credits will represent a new source of revenue for companies who are more environmental friendly. More importantly, the carbon trading scheme could give rise to a new market involving a wide spectrum of institutions much in the same way that trading of commodities and financial products has. That would imply opportunities for financial institutions, environmental consultancy companies, clean/green energy companies that specialised in emission reduction products and technology and so on.

### Heading the right direction

**The clean energy sector will be the next engine of growth**

Indeed, the government is targeting the clean energy sector as the next engine of growth which will complement the existing industrial structure. Singapore aims to become a global Clean Energy hub which will generate SGD 1.7bn worth of value-added and 7,000 jobs by 2015. A total of SGD 350mn has been dedicated to developing the industry and a Clean Energy Program office has been set up to drive it. Alternative energy sources such as the solar energy, fuel cells, wind power, tidal power and energy efficient technology and carbon trading services will be explored.

**Singapore has the prerequisites to become a global Clean Energy Hub**

Singapore has the prerequisites for the development of the new clean energy industry. With its strong industrial base, a reliable intellectual property protection regime, excellent infrastructure, skilled labour, incentive support from the government as well as extensive connectivity with the rest of the world, the island is an ideal incubator for research and development of new technologies.

Singapore's manufacturing sector can also be tapped for the production of energy efficient products and equipment for tapping alternative energy. It possesses key competitive advantages arising from its existing electronics, precision engineering and chemicals capabilities. In addition, the existing petroleum refining facilities can be used for the production of biofuels while the financial sector will be crucial in promoting carbon trading activities in Singapore and the region. Coupled with its existing pool of home-grown waste and water treatments companies, and its expertise in environmental consultancy services, Singapore has the components to build a whole ecosystem of environmental related industries.

### Green opportunities

**By recognising the new changes and focusing on opportunities in the clean energy sector, investors may gain from the biggest investment theme of tomorrow**

The drive for a green Singapore is partly economic pragmatism motivated by the belief that such efforts would eventually yield a reasonable level of economic returns. Along the way, some companies would stand to gain from this movement while others will fade. Yet there are ample investment opportunities for investors. The point to bear in mind is that the government is responding to the threat of climate change and hoping to ride on this new wave of economic opportunities. Thus, legislation designed to reduce greenhouse gas emissions may be introduced while industrial policies will be re-focused to promote energy efficient technology and products. There will be a growing demand for alternative energy and related equipment that will tap on this new energy source. By focusing on leading and progressive companies which produce products or services that stand to benefit from the development of the clean energy sector, investors may gain from the biggest investment theme of tomorrow.

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