Summary
Presented in this article is the summary of an extensive review of building energy efficiency policies in 11 Asian countries/economies (China, Hong Kong, India, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand). The review shows that the region is turning to stricter guidelines and requirements for building energy efficiency, and a variety of policy tools including appliance standards and labeling, building energy code, building energy performance rating and certification, financial incentives, government demonstration, awareness raising etc. are being utilized in the 11 countries, with differentiations in comprehensiveness and depth of each policy tool. In general, Singapore and Japan are the leaders in designing building energy efficiency programs that cover the most stages of a building’s life cycle and target both the suppliers and users of buildings. Korea, Taiwan, and Hong Kong follow, with China making substantial progress recently. Policy implementation in most countries reviewed (e.g. China, India, Indonesia, Malaysia, the Philippines, and Thailand) is still in a very early stage of development. A well-established institutional infrastructure that might support the implementation of the building energy codes is yet to be established.

Keywords
Energy Efficiency, Building Sector, Government Policy

1. Introduction

Over the last decade Asian countries have shown increasing interest in energy efficiency as one of the quickest, cheapest, and cleanest ways to address energy and environmental challenges. Generally the industrial sector has been the energy efficiency policy priority for Asian countries with the transportation sector now receiving increasing emphasis. The building sector which accounts for approximately one third of the region’s energy consumption is relatively new to most Asian countries’ energy efficiency policy agendas. Considering the fact that over half of the world’s new construction will take place in Asia over the next decade, Asia is well positioned to shape the world’s energy demand by the building sector.

This study is a review of building energy efficiency policies in Asian countries/economies (China, Hong Kong, India, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand). It is one part of Asia Business Council’s effort to identify opportunities to improve building energy efficiency in Asia. Through extensive literature review and interviews, the characteristic and trends of building energy efficiency policies in Asia are identified.

2. The challenges of energy security and environmental sustainability

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1 Data from Asia/World Energy Outlook 2006, The Institute of Energy Economics, Japan.
Just as Asia’s economic growth is far exceeding the rest of the world, the region’s demand for energy has become a formidable fact of worldwide energy demand. From 1971 to 2004, the world’s total primary energy consumption increased 87 percent, with an annual average rate of 1.9 percent. 43 percent of the total increment was attributable to Asia, where final energy consumption increased 275 percent, with an average annual rate of 4.1 percent. The world’s primary energy consumption is estimated to increase by 1.5 times from 2004 to 2030: fully half of that increase will come from Asia, whose share in the world’s energy demand will increase from 27.6 percent to 35.2 percent during the same period (Figure 1).

![Total Final Energy Consumption](image)

Figure 1, Total Final Energy Consumption by World, Asia, and Buildings in Asia
Source: data from Asia/World Energy Outlook 2006, The Institute of Energy Economics, Japan

This virtual explosion of energy consumption is raising concerns about Asia’s energy security and environmental sustainability. Asia’s dependency on imported oil is expected to grow from 55 percent in 2004 to 89 percent in 2030. Most importantly, Asia will increasingly depend on imports from the Middle East for almost all of its increased energy demands. From 2004 to 2030, the world’s CO2 emissions are projected to increase around 50 percent. More than 57 percent of that projected increase

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2 Dependency of Japan, China and Korea on the Middle East for oil supply will increase from 72 percent in 2004 to 83 percent in 2030.
will come from Asia, with China alone accounting for 30 percent, putting great pressure on environment sustainability in Asia and the world.


Asian countries are making strategic changes to their national energy policy in response to the rising risk in energy security and environment challenges. An extensive review of national energy policies of Asian countries shows the following two general trends in energy policies in Asian countries:

3.1 Energy Security vs. Environmental Sustainability

Before the 1990s, the objective of Asian countries’ energy policy was mainly to enhance national energy security by securing adequate energy supply to meet the needs of economic and social development. In the past two decades, in the wake of heightened concern about global warning, countries sought to strike a balance between national energy security and environmental sustainability, and environmental issues moved to the forefront of national energy policy. In light of recent hikes in energy prices, tight energy supply-demand conditions and geopolitical confrontation in Middle East, energy security has returned to the top of most countries’ energy agenda. However, almost all Asian countries are trying to address the problem of global warming in their energy policy, since the energy sector is the main source of greenhouse gas emissions in Asia. The major strategic response of Asian countries has been to place greater emphasis on energy conservation and efficiency and renewable energy sources, in order to secure energy security as well as to reduce emissions.

3.2 Energy Security vs. Energy Efficiency

Before the 1990s, focusing on the supply side was the common approach of most Asian energy policies. In the last decade, however, Asian countries have begun to stress the demand side of the energy sector, trying to achieve greater balance between stable energy supply and rational utilization of energy. It has been recognized by Asian countries that increasing energy efficiency before increasing supply is a more economically efficient national strategy; energy efficiency is increasingly seen as an alternative source of energy supply and an important tool to achieve energy security and reduce reliance on energy imports.

4. Building Energy Efficiency Policies and Initiatives

While Asian energy efficiency policies have largely focused on the industry sector first, the building sector has gained increasing attention in the 11 countries reviewed over the last decade because of astonishing growth in energy consumption in this sector.

The building sector typically accounts for about 20 to –30 percent of Asia’s energy consumption. With overall social and economic trends that signal continued strong economic growth, ongoing population explosion, increasing urbanization, living standard gains, and changing lifestyles, Asia will require a dynamic construction market and more energy to meet its needs for space and water/heating cooling, lighting, operating appliances and other equipment. Take China as an example, half of the world’s new building construction is and will be in this country in recent and the coming 10 years. From 1971 to 2004, total energy consumption in the building sector in Asia increased more than 260 percent, and is expected to increase 130 percent from 2004 to 2030. Its share in the world’s total energy consumption increased from 3.7 percent in 1971 to 7.3% in 2004, and is expected to increase to 11.2 percent in 2030.
To positively impact that growth, the region is turning to stricter guidelines and requirements for building energy efficiency and recently, sustainable or green buildings. A extensive review of building energy efficiency policies in Asia might show the following characteristics and trends:

**4.1 Basic Policy Tools Utilized**

A variety of policy tools are being utilized in the 11 countries to improve building energy efficiency. Among these policy tools, building energy codes/standards and appliance/equipment standards and labeling are the essential elements of Asian government’s policies, and have been adopted on mandatory or voluntary basis in all 11 countries reviewed in this study.

While setting the minimum performance standard, Asian governments are trying to stimulate market transformation and encourage efforts that go beyond the minimum, by raising awareness and creating financial incentives. In particular, Japan, Singapore and Korea are using financial incentives extensively, and they are being applied on a smaller scale in Hong Kong, Malaysia, Thailand. China is planning for them.

A government-led approach is common across Asia. In China, Hong Kong, India, Japan, Singapore, and the Philippines, energy efficiency programs/requirements targeted specifically at government buildings have been designed to make government buildings the role model and showcases of energy efficiency technologies and practices to the private sector. Facilitating market transformation through demonstration projects is also common in Asia, and such projects are underway in China, Hong Kong, Japan, Malaysia, Singapore, Taiwan and Thailand.

The rating and labeling of building in term of energy/environmental performance is a newly rising trend in Asia, and is gaining momentum in countries such as Japan, Singapore, Taiwan and Korea, Hong Kong, India, and China. In terms of energy performance benchmarking, there are some early efforts in Hong Kong, Singapore, and Taiwan, where the administrative work for benchmarking activities is relatively easier.

**4.2 Building Energy Codes/Standards**

Japan and Singapore were the first two countries in the region to develop and implement building energy codes in the 1970s after the oil crises, followed by Taiwan, Thailand, Malaysia, Indonesia, and the Philippines in the 1980s, China and Hong Kong in the 1990s, and more recently, India and Korea.

As energy efficiency opportunities are more widespread and cost-effective in the design stage, policies and standards in most countries currently focus on new buildings (the design stage of building). However, more and more countries are trying to establish programs that cover other stages of buildings’ life cycle.

Mandatory code has been approved to be more effective. Eight (China, Hong Kong, India, Philippines, Singapore, Korea, Taiwan, Thailand) of the 11 countries have mandatory building energy efficiency codes/standards and Japan is planning to make its code mandatory this year. There is also a general trend of upgrading and strengthening building energy codes/standards among these countries.

In terms of differentiation in comprehensiveness and depth of the building energy codes, the following observation can be gained through an extensive review of related reports and interviews with experts in this field:
Japan, Korea, Singapore, and Taiwan are the leading countries where the standards are now well-accepted as basic building requirements, with rigorous voluntary programs going beyond that base.

- In China and Thailand, the standards are being implemented, but efforts to go beyond them are still weak.
- In India, the Philippines, Malaysia, and Indonesia, standards have been developed, but implementation plans are still being developed.

### 4.3 Green Building Movement

However, government-initiated green building programs are achieving substantial traction in Japan, Singapore, Taiwan and Korea, and in Hong Kong, both the government and the private sector have launched green building programs. In India, non-government initiatives from industry associations and private companies have played an important role in promoting the green building concept. In China, the government unveiled a Green Building rating system in 2006.

In most Asian countries, however, including China, Hong Kong, India, Indonesia, Malaysia, the Philippines, and Thailand, the concept of green building is still in its infancy stage. While there are a few projects that are intended to improve environmental performance including energy efficiency, no concerted move towards green and sustainable design and the use of green building products exist yet.

### 4.4 Comprehensiveness and Sophistication of Building Energy Efficiency Policies

Singapore and Japan are the leaders in designing building energy efficiency programs that cover the most stages of a building’s life cycle and target both the suppliers and users of buildings. Korea, Taiwan, and Hong Kong follow, with China making substantial progress toward establishing building energy efficiency programs since 2004.

### 4.5 Non-government Programs

In most countries reviewed (except for Hong Kong and India), non-government programs aimed at promoting energy efficiency or green building are very rare. Government is still the most important force driving the changes toward building energy efficiency. However, along with the trends of liberalization, Asian governments tend to use more market-based initiatives, such as financial incentives, industry capacity building, and raising customer awareness, rather than administrative orders or direct subsidies.

### 4.6 Policy Implementation

Policy implementation in most countries reviewed (e.g. China, India, Indonesia, Malaysia, the Philippines, and Thailand) is still in a very early stage of development. For example, the Chinese government estimated that only 20% of buildings opened since 1996 comply with energy standards already in place. A well-established institutional infrastructure that might support the implementation of the building energy codes is yet to be established.

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5. Conclusion
Overall, the growing realization of the impact buildings have on our environment is driving Asian governments to explore the means for greater building sustainability, and the region is turning to stricter guidelines and requirements for building energy efficiency and recently, sustainable or green buildings.
Energy demand in the building sector in Asia is projected to grow in parallel with economic and population growth. China, because of the exploding new construction, and probably India, has the most significant increase and the biggest impact on Asia’s total consumption in the building sector.

Figure 2, Total Final Energy Consumption (1980-2030)

Figure 3, Final Energy Consumption by Buildings (1980-2030)

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Final Energy Consumption by Buildings

Per capita energy consumption in buildings in Asia shows a rapidly rising tendency, especially in countries like Korea, HK, Singapore, and Taiwan.

Source: Data from Asia/World Energy Outlook 2006, The Institute of Energy Economics, Japan
Note: the data for India is not available.