



CCOP-Norway Program for Enhancing Public Petroleum Management of the CCOP Member Countries (EPPM)

P2W4 : Workshop on Regulatory Framework for Carbon Capture & Storage (CCS) : with focus on storage into geological formations, HSE, CDM and flaring

Phuket, Thailand

CCOP Member Country/NOC Updates

July 2010

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CONTENT

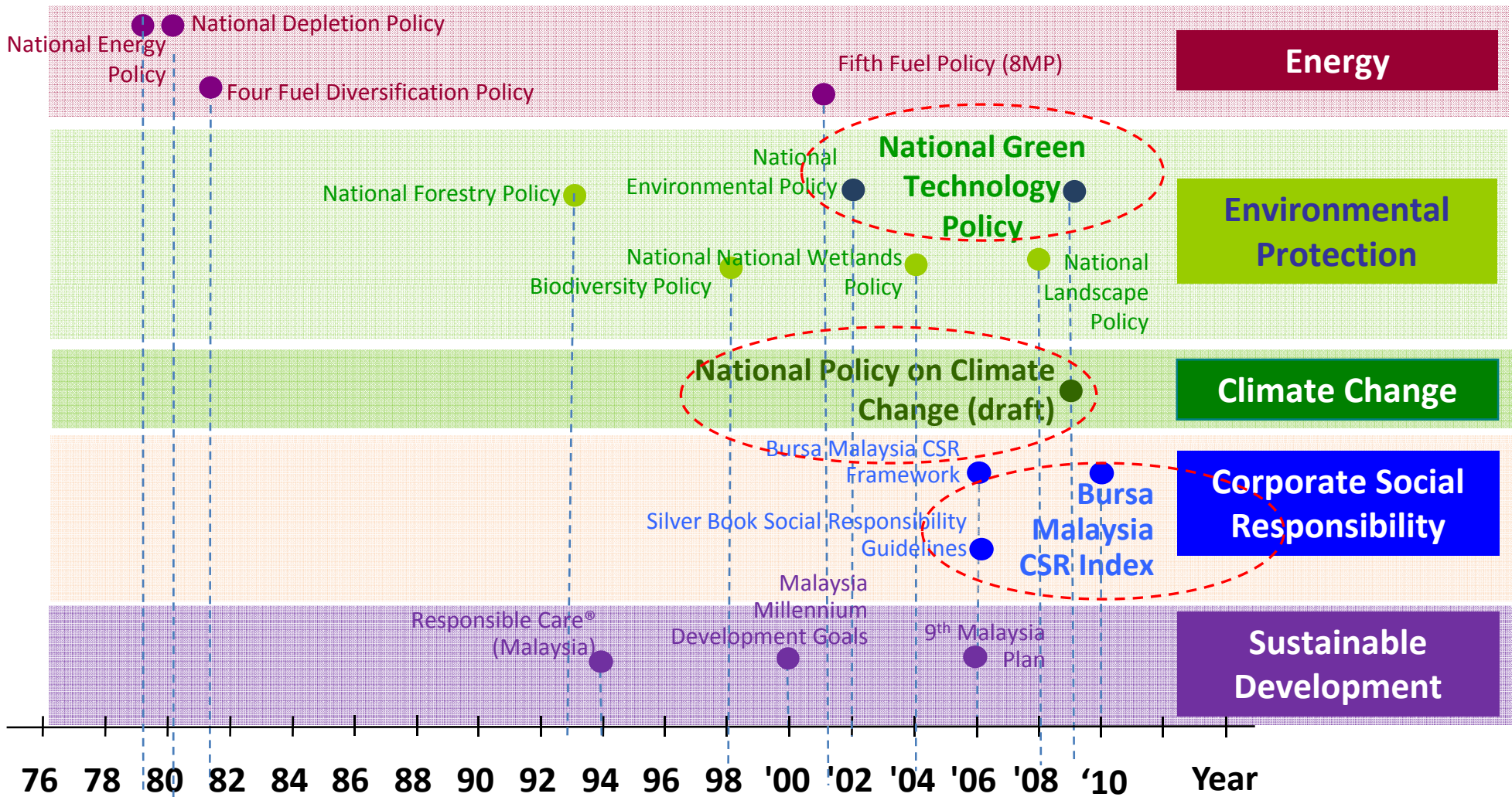


Regulations

PETRONAS Carbon Management Efforts

Challenges

In Malaysia, new regulations on environment, climate change and green technology may potentially change the rules of how industry operates



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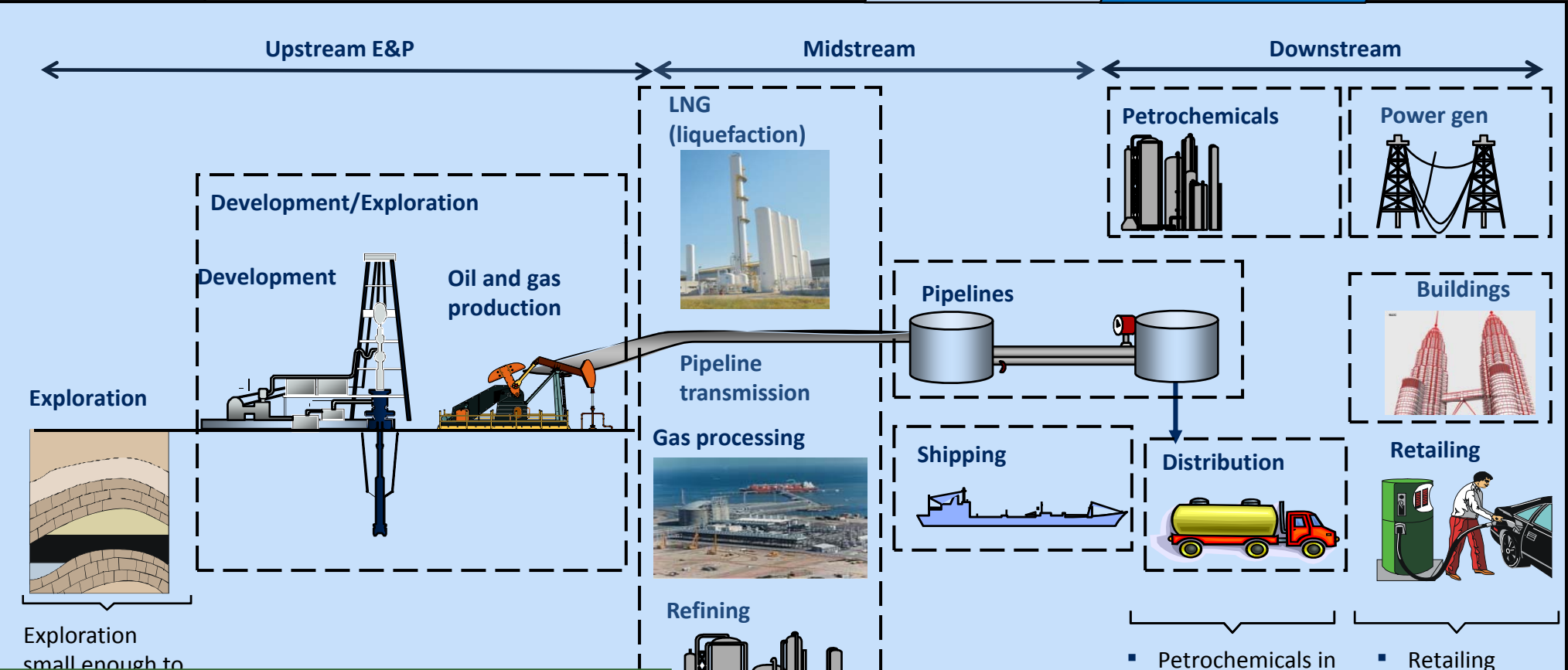


Regulations

PETRONAS Carbon Management Efforts

Challenges

PETRONAS efforts in the area of carbon management is focused on the PETRONAS key activities in the oil and gas value chain



Upstream Emissions Reduction Efforts

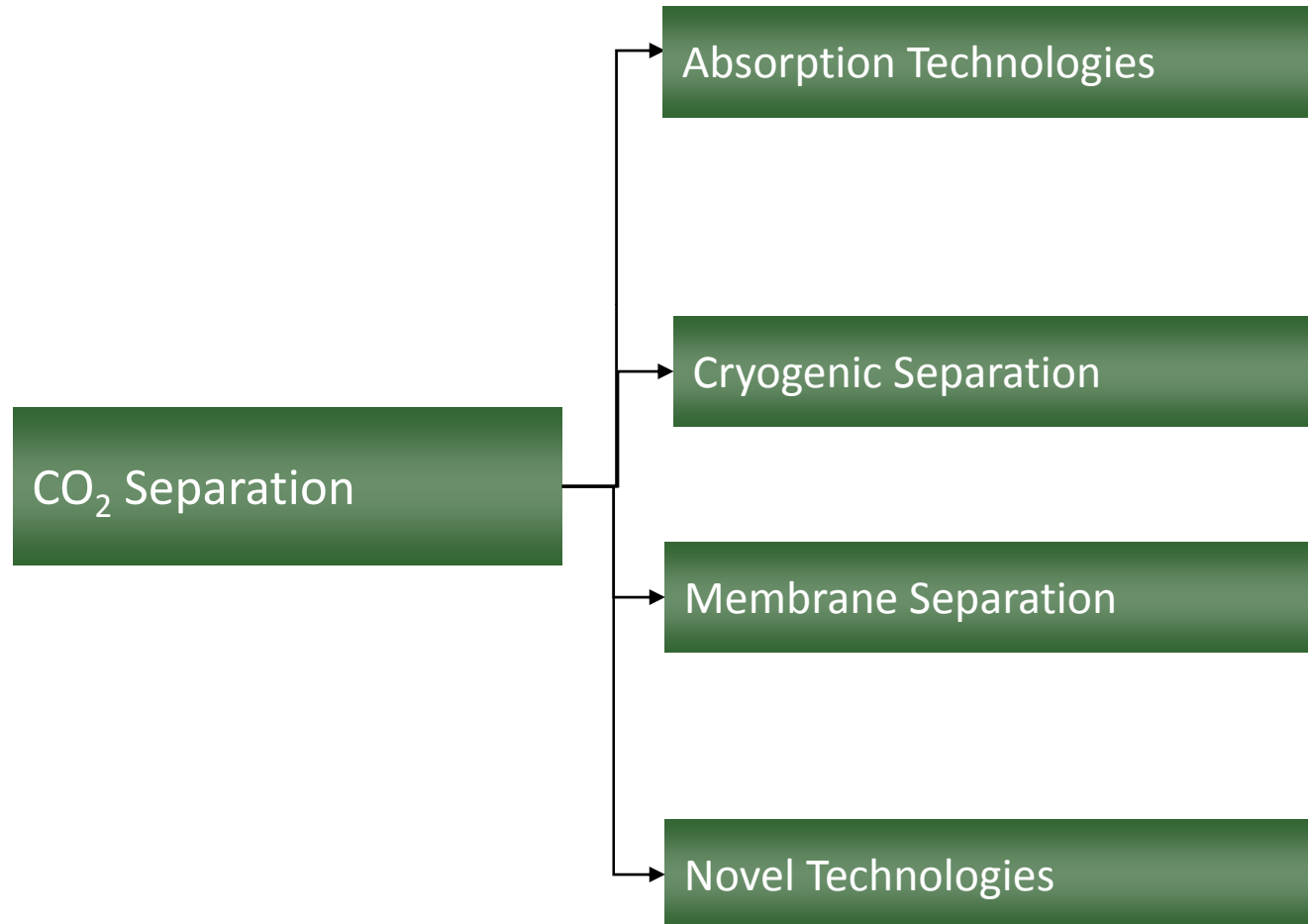
- ~ RM 172 million (7% reduction) savings against the targeted RM 112 million
- Met the goal to reduce 5% of the 2005 energy bill by end of 2008

Downstream Emissions Reduction Effort

- Achieved 7% reduction in the energy bill (estimated savings of about RM 172 million) for PETRONAS Downstream plants

- Petrochemicals in Chemicals
- Retailing covered in

There several technologies that currently available and pursued in the areas of CO₂ capture



Pipelines are preferred for transporting large amounts of CO₂ for distances up to around 1,000km

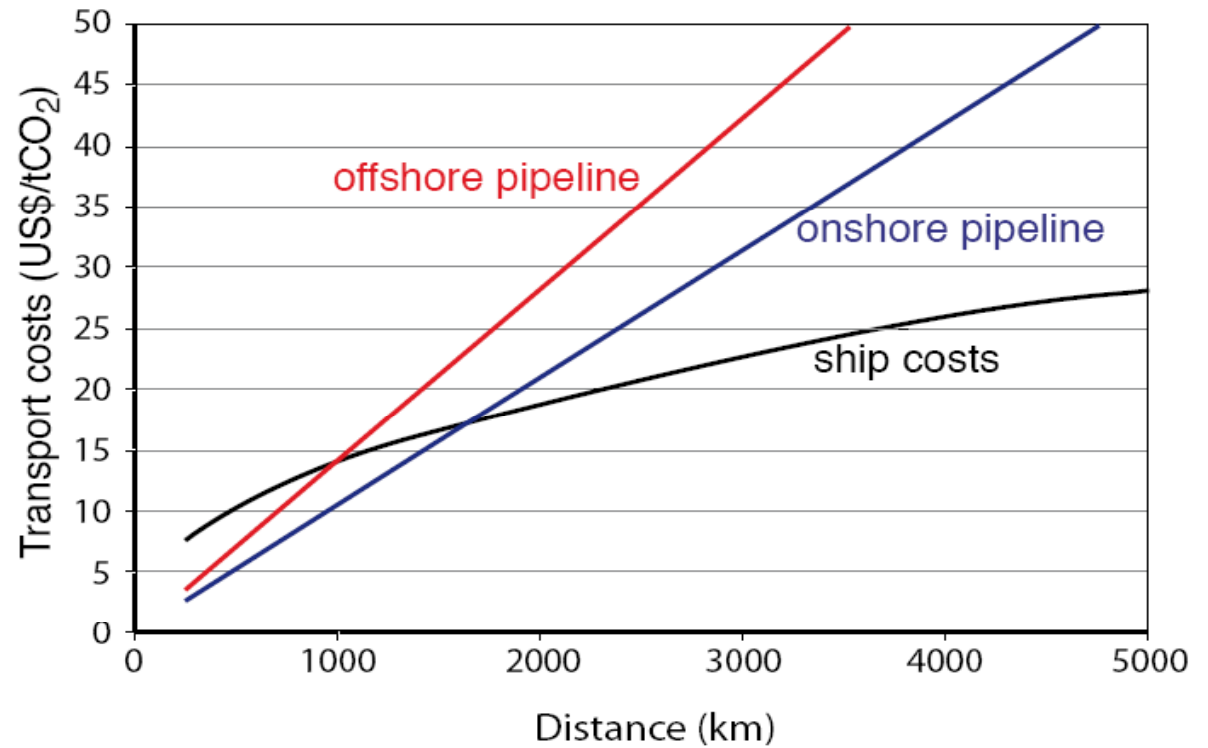


Pipeline Transport



CO₂ Tanker

Cost for transporting CO₂ for three methods; onshore and offshore pipelines and ship



Source: IPCC

Note: Pipeline costs are given for a mass flow rate of 6 MtCO₂/yr. Ship cost include intermediate storage facilities, harbor fees, fuel costs and loading and unloading activities

Major challenges in transporting CO₂ resolves around materials needed for pipelines to support highly corrosion environment

Issues and Challenges in CO₂ Transport

- Availability of new and cost effective alternative material
- Limited access to proprietary chemicals
- Reliability of corrosion monitoring tools

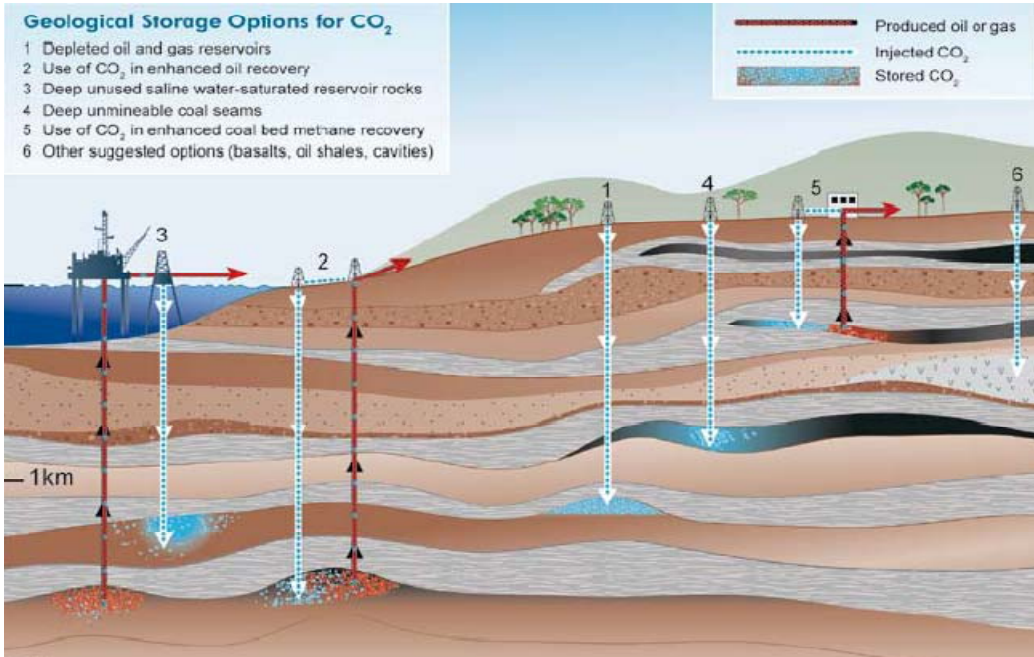


Research & Technology Focus

- Software for corrosion prediction
- Development of corrosion inhibitors in HPHT environment
- Lined and clad pipe materials



Exploratory Activities has been undertaken for CCS..



Geological Storage Options for CO₂

1. Depleted oil and gas reservoirs
2. Use of CO₂ in enhanced oil recovery
3. Deep saline water-saturated reservoir rocks
4. Deep coal seams
5. Use of CO₂ in enhanced coal bed methane recovery
6. Other suggested options (basalts, oil shales, cavities)

CO2 Storage & Utilization Initiatives

Enhanced Oil Recovery

- Investigation into the potential use of CO₂ for EOR-related projects to increase recovery factors for Malaysian reservoirs

Storage Options

- Identification of potential sites (depleted oil and gas reservoir, saline aquifer and etc) for CO₂ storage activities

CONTENT



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PETRONAS Carbon Management Efforts

Challenges

CCS Challenges for PETRONAS:

Capture

- No cost efficient technology available to separate High CO₂
- To maintain high pressure for CO₂ injection and transportation
- To have an efficient separation between liquid HC and CO₂
- Minimum pretreatment, footprint , energy consumption and HC loss
- Efficient and reliable CO₂ simulation tools

Transport


- Availability of new and cost effective alternative material
- Limited access to proprietary chemicals
- Reliability of corrosion monitoring tools

Storage

- High CO₂ sequestration cost
- Economic viability to convert CO₂
- Uncertainties on CO₂ sequestration technology
- Managing huge CO₂ volume

THANK YOU


Bursa Malaysia CSR Index

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About Us ▾
The Organisation ▾
Overview
Organisation Structure
Regulatory Structure
Corporate Governance ▾
History
ISO 9001 & 14001
CSR ▾
Our Approach
Environment
Workplace
Community
Marketplace
Resources
Investor Relations ▾
Downloads ▾
Our Holidays
Related Links
Bursa Malaysia Careers

**Environment**

Although Bursa Malaysia's overall environmental impact is indirect, we strive to manage our operations in a manner which reduces the consumption of resources and waste. Bursa Malaysia continues to monitor its energy and water consumption and implement resource-savings efforts throughout our premises. Combined, these efforts have seen fruitful results.

In a recent effort to set-off carbon emissions, a tree-planting activity was held at Rimba Bursa Malaysia, in Kepong Metropolitan Park – a 1.5acre land allocated by Dewan Bandaraya Kuala Lumpur. Over 300 trees were planted and adopted by staff and family members. This activity also fulfilled Bursa Malaysia's pledge to plant a tree for each team who participated in The Edge-Bursa Malaysia Kuala Lumpur Rat Race 2008.

In addition, to create further understanding on the importance of conserving and protecting the environment, awareness programmes were initiated which included screenings of related documentaries, sharing of educational articles and nature activities with children.

Bursa Malaysia's dual certification of ISO9001:2000 and ISO14001:2004 which were achieved in 2007, further showcased our commitment to providing stakeholders an assurance of quality in fulfilling their requirements whilst optimizing environmental performance.

National Policy on Climate Changes

- Taking another step to combat greenhouse emissions, Malaysia will launch its National Policy on Climate Change this year, Natural Resources and Environment Minister Datuk Seri Douglas Uggah Embas said today.
- He said a blueprint comprising five principles, 10 strategic thrusts and 43 key actions was focused on mitigation, adaptation measures and capacity building.
- "As the issue of climate change is cross-sectoral in nature, a number of ministries, including the natural resources and environment ministry, will be directly involved in implementing strategies and programmes aimed at tackling the issue.
- "The implementation of the climate change policy will drive efforts to reduce emissions and contribute to the larger agenda of resolving the issue of climate change," he said at the opening of a climate change seminar here.
- Douglas noted that Malaysia had already begun its roadmap to reduce emissions as pledged by Prime Minister Datuk Seri Najib Tun Razak to cut emissions by 50 percent from 2005 levels, at the Climate Change Conference in Copenhagen.
- He said the government would also draw up a comprehensive and detailed road map to address the climate change issue in the long term, he added.
- As part of its ongoing commitment, Douglas said the Pusat Tenaga Malaysia was re-designated recently as Malaysian Green Technology Corporation as further testimony of efforts to combat climate change.
- He added that Malaysia was also progressing in the implementation of environmentally-sound projects under the Clean Development Mechanism (CDM) and so far, registered 81 projects with the CDM Secretariat in Bonn, Germany.
- "I am proud to say, we currently rank fifth among countries in the world which had registered their CDM projects with the CDM Secretariat," he said