Climate Change and Technology Needs of Developing Countries

WIPO Regional Forum on Intellectual Property (IP) and Environmentally Sound Technologies (ESTs)

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TECHNOLOGY NEEDS

DEFINITION

The evolving need for technologies (new equipment, techniques, practical knowledge or skills) to meet development priorities through provision of low greenhouse gas services (mitigation) or reduction of the vulnerability of sectors (adaptation) to promote sustainable livelihoods and minimize the extent and adverse impacts of climate change.

DEVELOPMENT NEEDS

Short, mid and long term development priorities based national development strategies and stakeholder consultation.

MITIGATION

Technologies to reduce the sources

- The use of RE in
  - Electricity production
  - Heating for Domestic and Industrial Use
  - Cooling Climate control
  - Transport etc

or enhance the sinks of greenhouse gases

- e.g.:
  - Carbon capture and storage
  - Carbon sequestration

ADAPTATION

Technologies that can provide adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects

e.g.
• Coastal Zones: Coastal topography mapping and surveying, Hard coastal protection (dykes, floodgates, seawalls)
• Agriculture: Drought resistant varieties, crop rotation system, improved distribution system.

NON-MARKET BASED ("SOFT") TECHNOLOGIES

Activities in the field of capacity building, behavioral change, building information networks, training and research

TECHNOLOGY NEEDS

Process

- Identify technology needs based on development priorities and criteria of sustainability
- Identify the best technology options to address those needs
- To ensure that the technology options are able to address the needs in a sustainable manner (short, mid and long term)

TNA is defined as

• a set of **country-driven activities** that identify and determine the mitigation and adaptation technology priorities of Parties other than developed country Parties, and other developed Parties not included in Annex II, particularly developing country Parties.

• They involve **different stakeholders in a consultative process to identify the barriers to technology transfer** and measures to address these barriers through sectoral analyses.

• These activities may address soft and hard technologies, such as mitigation and adaptation technologies, **identify regulatory options and develop fiscal and financial incentives and capacity-building" (4/CP.7).**
Other types of support by UNFCCC:

- Technology Transfer Supported by the GEF
- Bilateral support
- Poznan Strategic Programme
- Training in preparing technology transfer projects for financing

For more info, please go to: http://unfccc.int/ttclear/jsp/Support.jsp
Generation, deployment and diffusion of climate EST technologies

Enabling Environment/
System of innovation

Generation, deployment and diffusion of climate EST technologies

Direction Setting
(Technology needs)

Legitimation/
Advocacy coalition

Entrepreneurial experimentation

Market formation

Resource Mobilisation
( Finance, Human Infrastructure)

Knowledge Development & Diffusion

Issue of knowledge transfer and IP???

Resource Mobilisation
(Finance, Human Infrastructure)
Global Level

- Mitigation
- Adaptation

National Level

Local Level

Local technology producers

Local technology users

Bottom up Technology Needs
LOCAL COMMUNITIES

Based on everyday technology needs of different community
## Overall Sustainable development and livelihoods

### Industrial-led Green Growth

<table>
<thead>
<tr>
<th>Needs of providers</th>
<th>Needs of Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation</td>
<td>Export Market Deployment</td>
</tr>
</tbody>
</table>

- **Low-income and isolated communities**
  - Generation: X
  - Export Market Deployment: X
  - Local Market Deployment: X
  - Diffusion: Meeting & greening everyday needs

- **Low-income and well-connected communities**
  - Generation: X
  - Export Market Deployment: X
  - Local Market Deployment: X
  - Diffusion: Meeting & greening everyday needs

- **High & Middle income and well connected communities**
  - Generation: X
  - Export Market Deployment: X
  - Local Market Deployment: X
  - Diffusion: Greening everyday needs

- **Universities / Research Institutes**
  - Generation: Research outputs/Consultancy
  - Export Market Deployment: X
  - Local Market Deployment: X
  - Diffusion: Greening everyday needs; Example to the community

- **SMEs / University & RI Spin-offs**
  - Generation: New business (for profit & strategic CSR)
  - Export Market Deployment: X
  - Local Market Deployment: X
  - Diffusion: Greening everyday needs

- **Large firms (MNEs, GLCs)**
  - Generation: New business (for profit & strategic CSR)
  - Export Market Deployment: X
  - Local Market Deployment: X
  - Diffusion: Greening everyday needs; Example to the industry

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**WIPO: Tech Transfer & IP Support**

**Different Challenges ??**
The Malaysian Experience
Policy framework:
• New Economic Model
• National Policy on Climate Change 2009
• National Policy on Green Technology 2009
• Economic Transformation Programme
• 10 years Malaysian Plans

Institutional framework:
• Various National Councils
• Economic Planning Unit (EPU)
  → Environment and Natural Resource Economics Section
• Ministry of Natural Resource and Environment (MNRE)
• Ministry of Energy, Green Technology and Water (KETTHA)
Development Needs: The New Economic Model

HIGH INCOME

GROWTH + WEALTH CREATION

SUSTAINABILITY

FIXING THE FOUNDATIONAL ISSUES

INCLUSIVENESS

NARROWING DISPARITY

TARGETS:

US$15,000 - $20,000 per capita by 2020

Rakyat

Quality of Life

Enables all communities to fully benefit from the wealth of the country

Meets present needs without compromising future generations

INCLUSIVENESS

SUSTAINABILITY
Policy Statement:
Ensure climate-resilient development to fulfil national aspirations for sustainability

Objectives:
• Mainstreaming climate change through wise management of resources and enhanced environmental conservation resulting in strengthened economic competitiveness and improved quality of life
• Integration of responses into national policies, plans and programmes to strengthen the resilience of development from arising and potential impacts of climate change; and
• Strengthening of institutional and implementation capacity to better harness opportunities to reduce negative impacts of climate change.
Policy Statement:
Green Technology shall be a driver to accelerate the national economy and promote sustainable development.

4 Main Pillars
Energy: attain energy independence and promote efficient utilization
Environment: conserve and minimise impact on the environment
Economy: enhance national economic development through use of technology
Social: improve the quality of life for all

Significant progress and major improvements in 4 areas:
Energy sector (Energy supply and utilisation)
Building sector
Water and waste management sector
Transportation sector
The pledge: Voluntary reduction

“voluntary reduction of up to 40% in terms of carbon emission intensity of GDP by the year 2020 compared to 2005 levels.

conditional on receiving the transfer of technology and finance of adequate and effective levels from Annex 1 countries”

YAB Prime Minister Datuk Seri Najib Tun Razak
17th December 2009, during his speech at COP15
Target Reduction of “Carbon Emission Intensity”

CO₂ Emission Intensity at 2005 Level
(tonnes CO₂ eq/ RM thousand)

- 2005: 0.621
- 2020: 0.373

40% reduction

The question is...
What are the potential mitigation options that are available to achieve the 40% reduction?

Source: NC2, 2011
Population Malaysia
18 million (1990) to 27.6 million (2010) – increase by 53%
(Source: Census Data, 2010)

Urbanization Rate
27% in 1960, 42% in 1990, 54% in 1994, 61.8% in 2000; expected to grow to 75% by 2020
(Source: RFN 2001)
## Greenhouse gas inventory

### Percentage of Greenhouse Gas Emission by Sectors in 2000

<table>
<thead>
<tr>
<th>Sector</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Sector</td>
<td>66%</td>
</tr>
<tr>
<td>Land Use Change and Forestry (LULUCF)</td>
<td>13%</td>
</tr>
<tr>
<td>Waste Sector</td>
<td>12%</td>
</tr>
<tr>
<td>Industrial processes</td>
<td>6%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>3%</td>
</tr>
</tbody>
</table>

### Key Source Analysis for Greenhouse Gas Emissions for Year 2000, with LULUCF

<table>
<thead>
<tr>
<th>Sector</th>
<th>Key category</th>
<th>GHG</th>
<th>Emissions (Gg CO₂ eq)</th>
<th>Level assessment (%)</th>
<th>Cumulative total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy industries</td>
<td>CO₂</td>
<td>58,486</td>
<td>26.2</td>
<td>26.2</td>
</tr>
<tr>
<td></td>
<td>Transport</td>
<td>CO₂</td>
<td>35,587</td>
<td>16.0</td>
<td>42.2</td>
</tr>
<tr>
<td></td>
<td>Manufacturing industries and construction</td>
<td>CO₂</td>
<td>26,104</td>
<td>11.7</td>
<td>53.9</td>
</tr>
<tr>
<td>Waste</td>
<td>Landfills</td>
<td>CH₄</td>
<td>24,541</td>
<td>11.0</td>
<td>64.9</td>
</tr>
<tr>
<td>LULUCF</td>
<td>Forest and grassland conversion</td>
<td>CO₂</td>
<td>24,111</td>
<td>10.8</td>
<td>75.7</td>
</tr>
<tr>
<td>Energy</td>
<td>Fugitive emissions from oil and gas systems</td>
<td>CH₄</td>
<td>21,987</td>
<td>9.9</td>
<td>85.6</td>
</tr>
<tr>
<td>Industrial processes</td>
<td>Mineral products (cement production, lime production and limestone and dolomite use)</td>
<td>CO₂</td>
<td>9,776</td>
<td>4.4</td>
<td>90.0</td>
</tr>
<tr>
<td>LULUCF</td>
<td>Emissions and removals from soil</td>
<td>CO₂</td>
<td>4,638</td>
<td>2.1</td>
<td>92.1</td>
</tr>
<tr>
<td>Industrial processes</td>
<td>Metal production (iron and steel production)</td>
<td>CO₂</td>
<td>2,797</td>
<td>1.3</td>
<td>93.4</td>
</tr>
<tr>
<td>Energy</td>
<td>Commercial</td>
<td>CO₂</td>
<td>2,122</td>
<td>1.0</td>
<td>94.4</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Rice production</td>
<td>CH₄</td>
<td>1,861</td>
<td>0.8</td>
<td>95.2</td>
</tr>
</tbody>
</table>

Source: Malaysia: Second National Communication to UNFCCC (2010)
### Potential Mitigation Options in Key Sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>Potential Mitigation Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Implementation of RE for power generation, Implementation of EE in the industry, commercial and residential sector, Implementation of RE in the industrial, commercial and residential sector, Transportation - Hybrid (hydrogen, fuel cell) &amp; electric vehicles, integrated public transportation system, bio fuels, low carbon petrol &amp; diesel</td>
</tr>
<tr>
<td>LULUCF</td>
<td>Maintain existing forest cover, Reduce emission from forest and land use related activities, Where appropriate, to increase existing forest cover</td>
</tr>
<tr>
<td>Waste</td>
<td>Encourage methane capture facilities at new sanitary landfills, Encourage palm oil millers to capture biogas for power generation, Encourage composting of organic waste, especially food waste and 3R (Reduce, Reuse and Recycle)</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Rice Management with water saving production: - Intermittent flooding - Aerobic rice, Livestock waste management through - Aerobic manure composting - Biogas capture, Partial replacement of synthetic Nitrogenous Fertilizer</td>
</tr>
<tr>
<td>Industrial Processes</td>
<td>Employ processes to reduce clinker use in cement production</td>
</tr>
</tbody>
</table>

Source: Malaysia: Second National Communication to UNFCCC (2010)
MITIGATION

MAIN POLICY FRAMEWORK

Overarching
New Economic Model (Economic Transformation Plan)
Cross-cutting Sustainability Policy
Green Technology Policy 2009; Climate Change Policy 2009

Sectoral (Energy)
National Energy Policy; Petroleum Development Act; National Petroleum Policy; Renewable Energy Act; Feed-in Tariff (FiT); National Energy Efficiency Master Plan

Low Carbon Cities
National Urbanisation Policy (2006), National Physical Plan (NPP), Regional Development Plans
Prime Minister

Working Committee on Green Technology and Climate Change (MTHPI)
(Industry, Human Capital, Research & Innovation, Promotion and Public Awareness, Transportation, Green Neighbourhood, Green growth, Adaptation)
Led by specific Ministries
Strategic Thrust 1
Strengthen the Institutional Framework

Inter-ministerial & Multi-agency

Sector Implementation Plans

Strategic Thrust 2
Provide conducive environment for Green Technology Development

Strategic Thrust 3
Intensify Human Capital Development in Green Technology

Strategic Thrust 4
Intensify Green Technology Research and Innovations

Strategic Thrust 5
Promotion and Public Awareness
MITIGATION

SPECIFIC ASSESSMENT

Specific Climate Change Technology Needs Assessment

Green Technology Roadmap

Regulatory Framework for Green Technology

Suruhanjaya Tenaga

EPU
Mitigation options – Energy

Potential Mitigation options (NC2)

• Implementation of Renewable Energy (RE) for power generation
• Implementation of RE in industry, commercial and residential sector
• Implementation of Energy Efficiency in industry, commercial and residential sector
• Transportation: hybrid (hydrogen, fuel cell) & electric vehicles, integrated public transport system, bio-fuels, low-carbon petrol & diesel.

Possible Mitigation options (MNRE)
Example: Supercritical coal-fired power plant

Actual Mitigation options (LCCFAS)
Assessment tool to track carbon emission at city levels to identify appropriate mitigation strategies in cities
ADAPTATION

?
**Technology Needs Analysis (TNA)**

- Identify tech needs based on development priorities and criteria of sustainability
- Identify the best technology options to address those needs
- To ensure that the technology options are able to address the needs in a sustainable manner (short, mid and long term)

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**Direction Setting (Technology needs)**

**Legitimation/ Advocacy coalition**

**Enabling Environment/ Innovation system**

**Generation, deployment and diffusion of climate technologies**

**Entrepreneurial experimentation**

**Knowledge Diffusion & Development**

**Issue of tech transfer and IP???”**

**Resource Mobilisation (Finance, Human Infrastructure)**

**Market formation**
Conclusion and way forward

• There are on-going efforts by UNFCCC to enhance TNA for developing countries. Access to these initiatives need to be improved.

• Strategic coordination and integration between initiatives under WIPO and UNFCCC e.g. between WIPO GREEN and ClimateTechWiki.

• A TNA is not a one off exercise, but an on-going and evolving process. Developing countries may already have various policies and institutional framework as a basis of its TNA. The big challenge is to reframe, improve, integrate and coordinate these different elements into a more a specific and sustainable TNA strategy.

• Current focus in countries like Malaysia is more on mitigation. How about other countries? How do we deal with adaptation?

• There are different levels and types of technology needs. Most challenging is to meet the needs of different community groups in developing countries – both for the purpose of economic development (providers) and overall sustainable development & livelihoods (users). The issue of tech transfer and IP may differ in different context.
Thank you!!!
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