GREEN TECHNOLOGY ROADMAP
BASELINE STUDY AND SUGGESTED
GREEN JOBS CREATION

WAN NADIA KAMARUDIN
Research Officer
Research, Development and Commercialization
Green Jobs Training Workshop
16 July 2012
Table of Content

- Introduction
- Low Carbon Economy Framework
- Situational Analysis Outcomes
- Key Findings under Social
- Green Growth Strategies
- Targeted Outcomes
INTRODUCTION

GT Policy, July 2009
- Defines national GT approach
- 4 pillars of GT Policy: Energy, Environment, Economy and Social
- 5 strategic thrusts identified: Institutional Frameworks, conducive environment, Human capital, R&D, promotion and awareness

GT Roadmap (Phase 1)
- Current state assessment & gap analysis
- Define National Green Technology Vision
- Define Low Carbon Economic model
- Define national GT strategic directions and measurement criteria and mechanism

GT Roadmap (Phase 2)
- Implementation plan with measurable targets
- Implementation of strategies

National GT Agenda
INTRODUCTION

Task 1: Current State Assessment
- 1.1 Existing initiatives on green technology development
- 1.2 Institutional set-up, regulatory framework, legislation, financial mechanisms
- 1.3 Assess Green Technology business environment
- 1.4 Research and Development (R&D) situation

Task 2: Gap Assessment
- 2.1 Identify key internal and external shortfalls and barriers
- 2.2 Global Green technology development efforts

Task 3 - Strategic Direction Setting
- 3.1 Framework for green technology roadmap
- 3.2 Green Technology action plan

Sectors in Scope
- Energy
- Building
- Water & Waste Management
- Manufacturing
- Transportation
- Green ICT

Greening the Nation
Greening Asia
Low Carbon Economy Framework

- **Baseline Measurement area:** GHG Emission
- **Baseline Measurement area:** Spending on GT R&D
- **Baseline Measurement area:** EPI index

**Social well being for the citizen**
- Baseline Measurement area: No. of green jobs

**Contributions of green businesses to national economy**
- Baseline Measurement areas: GDP contribution, GNI contribution

**Innovation on Green Technology**
- Baseline Measurement area: Spending on GT R&D

**Malaysia’s position in Global Index**
- Baseline Measurement area: EPI index

**GHG emission by strategic sectors**
- Baseline Measurement area: GHG Emission
Situational Analysis Outcomes

**Areas of Assessment**
- Innovation
- Infrastructure
- Financial Incentives
- Human Capital
- Regulatory Framework

**Incentives**
- Policies are in place
- Holistic regulatory framework i.e. Act, rules, regulations has yet to be in place
- Ineffective implementation framework – misaligned agency roles and responsibilities
- Incentives are in place
- Penetration in low
- Limited options for funding for different stages (e.g. tax incentives for consumer, commercialization funding)

**Infrastructure**
- Infrastructure to support adoption is lacking
- Initiatives are already planned under RMK-10, ETP
- Infrastructure to support adoption is lacking
- Initiatives are already planned under RMK-10, ETP

**Innovation**
- Local companies are initiating R&D activities
- Weak linkages between companies and research institutions
- R&D infra are in place
- R&D expenditure is still considered low (national level)
- Programs addressing awareness are in place
- Desired adoption levels are not present

**Financial Incentives**
- Policies are in place
- Holistic regulatory framework i.e. Act, rules, regulations has yet to be in place
- Ineffective implementation framework – misaligned agency roles and responsibilities
- Incentives are in place
- Penetration in low
- Limited options for funding for different stages (e.g. tax incentives for consumer, commercialization funding)

**Human Capital**
- Skills gap related to GT
- Learning institutions are gearing up
- Unclear definition of green collar workers and green jobs
- Skills gap related to GT
- Learning institutions are gearing up
- Unclear definition of green collar workers and green jobs
Baseline Assessment:
Key Findings Under Social

Number of Green Jobs as Percentage of Total Workforce in 2009 (MOHR 2010, Frost & Sullivan 2010)
Baseline Assessment:
Key Findings Under Social

- Green jobs created by green business in 2009 is around 95,126 jobs or 1% of total workforce are employed by green companies.
- Largest segment of green jobs in 2009 is in the transportation and water and waste management sector which constitute 46%, however the segment is heavily populated by semi skilled workers.
- Primary survey qualitative feedback reveal that technical expertise to support innovation activities as well as green technology and green practices implementation are still lacking.

Demand: Green Jobs by Strategic Sector in 2009

Supply: Professional Courses for Green Collar Workers have expanded due to high demand from the industry

- Certification programme for Electric Energy Manager
- 141 (ELECTRICAL ENERGY MANAGERS)
- GBI Commissioning Specialist (CsX) certification and Green Building Certifier and Facilitator Certification
- 381 (GBI ACCREDITED FACILITATORS)
Baseline Assessment:
Key Findings Under Social

- Human capital development policies to support the green jobs are not in place
- No clear initiatives yet to address green job agendas at the national level
- No clear competency matrix for green professionals or semi-professionals
- Businesses’ perspective – clear national definition to define competencies and skills for green jobs
- Training at a company level is also limited on green initiatives
- Demand-supply gap - quality of supply from the universities don’t match up to the industry standards
National Green Growth Strategies

Key Focus Areas

- **Economy**
  - GT as a sector

- **Environment**
  - Carbon footprint tracking
  - Water footprint tracking
  - Reduce energy intensity
  - Efficiency in natural resources management

- **Social**
  - Green culture as way of life
  - Developing green jobs
  - GT Contribute to QoL Improvement

- **Global Standing**
  - Improve ranking in Environmental Performance Index

- **Innovation**
  - Building Centre of Excellence

Key Focus Enablers

- Human Capital as core enablers
- Infrastructure to support the implementation
- Financial incentives to increase adoption and encourage the industry development
- Holistic Regulatory Framework: Carbon Taxes/ Cap and Trade
- Marketing & Branding Support
**Desired Outcomes: Social**

- Green businesses within the six sectors alone are expected to create more than 450,000 jobs by year 2025.
- However this will only be achieved with the right intervention programmes including providing incentives for green collar workers, developing the industry which will demand workforce.

### Graph: Green Jobs Growth Rate

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Green Jobs</th>
<th>Growth Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>91,405</td>
<td>12.5%</td>
</tr>
<tr>
<td>2010</td>
<td>102,858</td>
<td>12.8%</td>
</tr>
<tr>
<td>2015</td>
<td>188,160</td>
<td>8.5%</td>
</tr>
<tr>
<td>2020</td>
<td>283,518</td>
<td>9.8%</td>
</tr>
<tr>
<td>2025</td>
<td>451,704</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** F&S Analysis
# Key Next Steps to be implemented in Phase 2

<table>
<thead>
<tr>
<th>Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study on <em>Green Growth and Sustainability</em> Regulatory Framework</td>
</tr>
<tr>
<td>Setup Governing Structure</td>
</tr>
<tr>
<td><strong>Establish National Definition for Green Jobs and Green Collar Worker</strong></td>
</tr>
<tr>
<td>Develop specific training programmes for green jobs</td>
</tr>
<tr>
<td>Develop Green Job Platform</td>
</tr>
<tr>
<td>Develop promotional programme and improve uptake for existing financial incentives</td>
</tr>
<tr>
<td>Gazette green industrial and business park</td>
</tr>
<tr>
<td>Develop innovation platform for green businesses and research institutions</td>
</tr>
<tr>
<td>Comprehensive study on consumer awareness and adoption</td>
</tr>
<tr>
<td>Targeted Energy Efficiency Programmes for critical buildings and facilities</td>
</tr>
<tr>
<td>Green Roadmap Phase 2</td>
</tr>
</tbody>
</table>
Key Focus Areas (Energy)

**Energy Efficiency**
- Promote energy efficient appliances
- Create sector wise quota for EE targets
- Government to lead EE initiatives across its agencies
- Energy Efficient Transportation
- Further reduction of subsidies on conventional energy sources
- Restructure electricity supply industry

**Solar Photovoltaics (PV)**
- Feed in Tariff (FIT) to provide a major boost for adoption
- Utilities should include PV in their long term strategy (including RPS)
- Encourage local companies to enter PV

**Biomass**
- Promote cogeneration
- Support biomass projects to achieve carbon credits
- Invest in R&D for new technologies
- Assure long term supply of diversified feedstock

**Biogas**
- Easy Access to the electricity Grid
- Ease the financing by providing investment security and long term favorable price
- R&D infrastructure development
- Coherence of relevant policies

**Transmission and Distribution – Smart Grid**
- Start with smart meter roll out for Commercial & Industrial customers
- Focus on distribution automation
- Local telecom companies to gain experience on Advanced Metering Infrastructure (AMI) projects
- Smart grid incubators can co-exist with eco-cities and Renewable projects

**Green Technology in Oil and Gas**
- Flaring reduction initiative
- Energy Loss Management
- Waste Heat Recovery
- Using bio-friendly drilling fluid

**Key Focus Enablers**
- Human Capital
- Infrastructure
- Financial incentives
- Holistic Regulatory Framework
- Marketing & Branding Support
## Targeted Outcomes (Energy)

<table>
<thead>
<tr>
<th>KPIs</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Green Jobs</td>
<td>4,403</td>
<td>11,824</td>
<td>20,280</td>
<td>26,319</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution to national GDP (RM Million)</td>
<td>530</td>
<td>1,377</td>
<td>2,771</td>
<td>3,761</td>
</tr>
<tr>
<td>Contribution to national GNI (RM Million)</td>
<td>520</td>
<td>1,350</td>
<td>2,716</td>
<td>3,685</td>
</tr>
</tbody>
</table>
# Key Focus Areas (Water & Waste)

## Key Focus Areas

<table>
<thead>
<tr>
<th>Waste Management</th>
<th>Collection and Transportation</th>
<th>Transfer Stations</th>
<th>Sanitary Landfills</th>
<th>Thermal Treatment Plats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recycling</td>
<td>Separation at source</td>
<td>Composting</td>
<td></td>
</tr>
<tr>
<td>Water Management</td>
<td>EE Equipment</td>
<td>Sludge Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater Management</td>
<td>Water Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Use Minimization</td>
<td>Renewable Energy</td>
<td>EE Equipment</td>
<td>Capacity Building</td>
<td>Bio Solid Reuse</td>
</tr>
<tr>
<td></td>
<td>Water Reclamation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Key Focus Enablers

- Human Capital as core enablers
- Infrastructure to support the implementation
- Financial incentives to increase adoption and encourage the
- Holistic Regulatory Framework
- Marketing & Branding Support
## Targeted Outcomes (Water & Waste)

<table>
<thead>
<tr>
<th>KPIs</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Green Jobs</td>
<td>21,926</td>
<td>27,166</td>
<td>41,517</td>
<td>96,570</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution to national GDP (RM Million)</td>
<td>2,050</td>
<td>2,424</td>
<td>3,384</td>
<td>8,459</td>
</tr>
<tr>
<td>Contribution to national GNI (RM Million)</td>
<td>2,009</td>
<td>2,375</td>
<td>3,316</td>
<td>8,290</td>
</tr>
</tbody>
</table>
### Key Focus Areas (Building)

#### Key Focus Areas

<table>
<thead>
<tr>
<th>Green Building Design</th>
<th>Carbon Emission Reducing Design</th>
<th>Green Element in Town Planning</th>
<th>Increase Green Architects and Designers</th>
<th>Knowledge Database of Green Pros. And Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Building Construction</td>
<td>Green Procurement</td>
<td>New Residential to Incorporate Green Design</td>
<td>Existing Residential to be Retrofitted Green</td>
<td>Existing and New Townships to be Green</td>
</tr>
</tbody>
</table>

#### Key Focus Enablers

- Human Capital as core enablers
- Infrastructure to support the implementation
- Financial incentives to increase adoption and encourage the uptake of Green Technology
- Holistic Regulatory Framework
- Marketing & Branding Support
## Targeted Outcomes (Building)

<table>
<thead>
<tr>
<th>KPIs</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Green Jobs</td>
<td>10,906</td>
<td>34,907</td>
<td>49,274</td>
<td>78,470</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution to national GDP (RM Million)</td>
<td>1,930</td>
<td>8,805</td>
<td>11,118</td>
<td>15,135</td>
</tr>
<tr>
<td>Contribution to national GNI (RM Million)</td>
<td>1,891</td>
<td>8,629</td>
<td>10,629</td>
<td>14,842</td>
</tr>
</tbody>
</table>
# Key Focus Areas (Transport)

## Key Focus Areas

<table>
<thead>
<tr>
<th>Environmentally Friendly Private Vehicles</th>
<th>Roadmap for green vehicle fuel technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greener Public Transport</td>
<td>Cleaner fuel technology</td>
</tr>
<tr>
<td>Greener Freight Transportation</td>
<td>Bi-fuel powered freight trucks</td>
</tr>
<tr>
<td>Greener Railway Infrastructure</td>
<td>Building greener railway Infrastructure</td>
</tr>
<tr>
<td>Greener Aviation Infrastructure</td>
<td>Electric ground handling vehicles at airports</td>
</tr>
<tr>
<td>Greener Maritime Infrastructure</td>
<td>Ratify Ballast Water Mgt. convention</td>
</tr>
</tbody>
</table>

## Key Focus Enablers

- **Human Capital**: Building industry-wide awareness on green practices, benefits and significance
- **Regulatory Framework**: Establishing precise regulatory measures and comprehensive enforcement structure for green practices
- **Infrastructure**: Developing the necessary transport infrastructure to support green technology and practices
- **Financial Incentives**: Launching attractive subsidy and incentive programs to promote adoption across stakeholders
- **Marketing & Branding Support**: Communication campaigns and training programs, especially for public and GLC sector enterprises

---

*Greening the Nation, Greening Asia*
## Targeted Outcomes (Transport)

<table>
<thead>
<tr>
<th>KPIs</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Green Jobs</td>
<td>21,595</td>
<td>23,914</td>
<td>26,411</td>
<td>29,200</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution to national GDP (RM Million)</td>
<td>2,205</td>
<td>2,521</td>
<td>2,902</td>
<td>3,279</td>
</tr>
<tr>
<td>Contribution to national GNI (RM Million)</td>
<td>2,161</td>
<td>2,471</td>
<td>2,844</td>
<td>3,214</td>
</tr>
</tbody>
</table>
## Key Focus Areas (Manufacturing)

<table>
<thead>
<tr>
<th>Key Focus Areas</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar PV</td>
<td>Establish Malaysia as a Global Solar PV Manufacturing Hub</td>
</tr>
<tr>
<td></td>
<td>Manufacturing Hub for Solar PV in Malaysia; Attract global players</td>
</tr>
<tr>
<td>LED Manufacturing</td>
<td>Move up the value chain in LED manufacturing and Design</td>
</tr>
<tr>
<td>Electric Home Appliances</td>
<td>Labeling of Energy Efficient Products</td>
</tr>
<tr>
<td></td>
<td>Showcasing and demonstration of energy efficient appliances</td>
</tr>
<tr>
<td>Waste to product</td>
<td>Promote Reduce Reuse and Recycle</td>
</tr>
<tr>
<td></td>
<td>Establish more recycling plants for metals, plastics and paper wastes.</td>
</tr>
<tr>
<td>Green Building Materials</td>
<td>Develop eco-friendly standards for buildings materials'</td>
</tr>
<tr>
<td></td>
<td>Reduction of particulate waste in particulate matter</td>
</tr>
<tr>
<td>Electric Vehicles</td>
<td>Recharging Stations Infrastructure</td>
</tr>
<tr>
<td></td>
<td>Commercialize Electric Vehicles (EV) Technology and Infrastructure</td>
</tr>
<tr>
<td>Green IC Design</td>
<td>Labeling of Energy Efficient Products</td>
</tr>
<tr>
<td></td>
<td>Showcasing and demonstration of energy efficient appliances</td>
</tr>
<tr>
<td>Green Manufacturing Practices</td>
<td>Improve Efficiency and optimize the manufacturing process &amp; products</td>
</tr>
<tr>
<td></td>
<td>Promote Green Productivity and Lean Manufacturing</td>
</tr>
</tbody>
</table>

## Key Focus Enablers

- Human Capital as core enablers
- Infrastructure to support the implementation
- Financial incentives to increase adoption and encourage the
- Holistic Regulatory Framework
- Marketing & Branding Support
## Targeted Outcomes (Manufacturing)

<table>
<thead>
<tr>
<th>KPIs</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Green Jobs</td>
<td>24,342</td>
<td>63,110</td>
<td>114,332</td>
<td>184,228</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution to national GDP (RM Million)</td>
<td>3,697</td>
<td>11,947</td>
<td>25,254</td>
<td>45,472</td>
</tr>
<tr>
<td>Contribution to national GNI (RM Million)</td>
<td>3,503</td>
<td>11,708</td>
<td>24,749</td>
<td>44,592</td>
</tr>
</tbody>
</table>
Key Focus Areas (ICT)

Key Focus Areas

- **eServices**
  - Enabling SMEs and citizens with eServices
  - E-Government
  - Legalized e-Docs

- **Green Data Center**
  - Developing green data center standards
  - Consolidation of Government Hosting
  - Enhancing awareness among business

- **Unified Communications**
  - Enabling increased participation of local players
  - Teleworking

- **Green ICT Practices (3Rs)**
  - Enabling Government Agencies with green ICT practices
  - Enabling enterprises with green ICT practices
  - Standards for IT equipment and labeling

Key Focus Enablers

- Human Capital as core enablers
- Infrastructure to support the implementation
- Financial incentives to increase adoption and encourage the industry development
- Holistic Regulatory Framework towards sustainable green economy
- Innovation
## Targeted Outcomes (ICT)

<table>
<thead>
<tr>
<th>KPIs</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Green Jobs</td>
<td>19,686</td>
<td>27,240</td>
<td>31,704</td>
<td>36,918</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution to national GDP (RM Million)</td>
<td>3,277.4</td>
<td>8,552.0</td>
<td>22,557.2</td>
<td>50,710.2</td>
</tr>
<tr>
<td>Contribution to national GNI (RM Million)</td>
<td>3,212</td>
<td>8,381</td>
<td>22,106</td>
<td>49,696</td>
</tr>
</tbody>
</table>