Malaysian Financial Mechanisms for Renewable Energy (RE) & Future Direction

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Malaysia

- Population: 27.7 million (2008) (Malay, Chinese, Indian, others)
- Land size: 330,000 km²
- GNI per capita: US$7,479 (GDP: 6% - 0.1%)
- Maximum electricity demand:
  - 13.6 GW (2005)
  - 20 GW (2010)
- Installed electricity capacity:
  - 19.2 GW (2005)
  - 25.3 GW (2010)
- Electricity generation mix:
  - 2005: 70% NG; 22% coal; 6% hydro; 2% oil
  - 2010: 56% NG; 36% coal; 6% hydro; 0.2% oil; 1.8% RE

Malaysian Electricity Supply Industry

- Cabinet
  - Ministry of Energy, Water & Communications (NEWMU)
  - Economic Planning Unit (EPU)
    - Prime Minister’s Department
  - Ministry of Finance
  - Malaysia Energy Commission (ST)
  - Independent Power Producers (IPPs)
  - Co-generations
Malaysia Energy Policy

To ensure provision of adequate, secure and cost-effective energy supplies by developing indigenous energy resources, both non-renewable and renewable, using the least-cost options and diversifying supply resources within and outside the economy.

To promote the efficient utilisation of energy and the elimination of wasteful non-productive patterns of energy consumption.

To minimise the negative impacts of energy production, transportation, conversion, utilisation and consumption on the environment.

Trends of Fuel Sources for Power Generation

**Untapped Potential: Solar Power**

- Suitable building roof surfaces*:
  > 65 million m² x 100 Wp/m² = > 6,500 MWp
  * 2.5 million houses (42%) + 40,000 commercial buildings (5%)

- PV covering 0.6% (786 km²) land of Peninsular Malaysia can provide enough electricity supplied by TNB in 2007 (86.5 TWh)
5th Fuel Policy: RE Potential & Status Quo

**Support Mechanism**
- Approvals & licenses
- REPPA: RM/kWh 0.21 (biomass, biogas); 0.17 (hydro), net-meter (PV)

**Promotion Mechanisms**
- Pilot projects & case studies
- Capacity building & lessons
- Financing & policy developments

### RE Support & Promotion Mechanisms

**Support Mechanism**
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**Key Issues Affecting RE**

1. Market failure exists
2. Constraints
3. Arbitrary policy setting
4. Limited oversight
5. Poor institutional framework
6. Absence of regulatory frameworks
7. Lack of institutional framework

**Needs for a New RE Policy & Action Plan**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Action</th>
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<tbody>
<tr>
<td>1</td>
<td>To address current market failure</td>
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<td>2</td>
<td>To provide long term sustainability (avoid start and stop policy)</td>
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<td>3</td>
<td>To stimulate a new growth industry</td>
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<td>4</td>
<td>To recognize the importance of the environment as an economic growth contributor</td>
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<tr>
<td>5</td>
<td>To develop human capital resources particularly in the field of R&amp;D in RE technologies</td>
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<tr>
<td>6</td>
<td>To improve the coherence of current policy</td>
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**New RE Policy & Action Plan**

**Vision**
- Promoting the utilisation of independent renewable energy sources to contribute to sustainable national energy supply, society and sustainable socio-economic development.

**Objectives**
1. To increase RE contribution to the national power generation mix;
2. To facilitate the growth of the RE industry;
3. To reduce renewable RE generation costs;
4. To ensure the environmental sustainability of generation, and;
5. To enhance awareness among the public and improvement of RE.

**Strategic Threads**
- Thread 1: Introduction and Implementation of Appropriate Regulatory Framework
- Thread 2: Introduction and Implementation of Adequate Financial Instruments
- Thread 3: Institutional and Market Developments
- Thread 4: Knowledge and Research for Development
- Thread 5: Implementation and Improvement of Action Plan

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**Choices: RE Support Mechanism**

**Feed-in Tariff (FiT): The Choice for RE Regulatory Framework**
- A mechanism that allows electricity that is produced from RE resources to be sold to power utilities at a fixed premium price and for specific duration.
- Provides a conducive and secured investment environment which will make financial institutions to be comfortable in providing loan with longer period (> 10 years).
  - Provides fixed revenue stream for installed system
  - Only pays for electricity produced – promotes system owner to install good quality and maintain the system
  - With suitable degression rate, manufacturers and installers are promoted to reduce costs while maintaining quality
  - Disadvantage: does not address first cost barrier

**Verifications of FiT Effectiveness (selected)**
- **Stem Review Report:**
  - Sir Nicholas Stern stated that “Comparisons between deployment support through tradable quotas and feed-in tariff price support suggest that feed-in mechanisms achieve larger deployment at lower costs.”
- **UNDP-GEF Report: Promotion of Wind Energy - Lessons Learned From International Experience and UNDP-GEF Projects**
  - “Feed-in tariff policies have been very effective in Germany, Spain and Denmark, leading to the world’s first, second and fifth installed wind energy capacities.”
- **International Energy Agency: Deploying Renewables - Principles for Effective Policies**
  - “Feed-in Tariffs are more effective and cheaper than quotas for Renewable Energy”
- **Ernst & Young Report: Renewable Energy Country Attractiveness Indices**
  - “Feed-in Tariffs are cheaper than Trading System”
Evidences of FiT Effectiveness

- Germany revolutionised RE deployment with the implementation of EEG (RESA) in 2000
- Germany records exponential RE growth since 2000 (due to no limit of annual capacity)
- By 2007, Germany’s FiT model replicated by 20 EU Member States
- By 2007, EEG generates national economic benefits equivalent to Euro 9.4 billion VS cost of Euro 3.3 billion

Critical Factors for an Effective FiT Mechanism

- Access to the grid must be guaranteed. Utilities must be legally obliged to accept all electricity generated by RE private producers.
- FIT rates must be high enough to produce a return on investment plus a profit (not excessively) to act as an incentive.
- FIT rates must be fixed for a long enough period (typically 20 years) to give certainty and provide businesses with clear investment environment.
- There must be adequate “deggression” for the FIT rates to promote cost reduction to achieve “grid parity”, where an annual stepwise reduction in tariffs by a certain percentage is mandated.
- Adequate fund is created to pay for the FIT rates (or the incremental cost) and guarantee the payment for the whole FIT contract period.
- There must be constant monitoring and progress reporting.

Determining FIT Rates (Malaysia)

Biomass
- Capex (investment cost)
- Loan rates (8.8%), period (15 years)
- Fuel: requirement (230,000 t/yr), prices, transport charges
- Costs: O&M, depreciation, insurance
- Revenue: FIT rates, duration (16 yrs), capacity factor (70%), other revenue
- Annual cost increment (3%): fuel, transport, O&M, insurance
- IRR, SPB, cash-flow

Solid waste
- Capex (investment cost)
- Loan rates (8.8%), period (15 years)
- Fuel: requirement (3,000 t/day), prices, transport charges
- Costs: O&M, depreciation, insurance
- Revenue: FIT rates, duration (21 yrs), capacity factor (70%), other revenue (tipping fee, recycling)
- Annual cost increment (4%): fuel, transport, O&M, insurance
- IRR, SPB, cash-flow

Solar PV
- Capex (investment cost - RM22/Wp avg)
- Loan (80%): rates (6%), period (15 years)
- Costs: O&M, depreciation, insurance
- Revenue: FIT rates, duration (21 yrs), capacity factor (13%)
- Annual cost increment (3%): O&M, insurance
- SPB, IRR, cash-flow

Please refer to www.onlinepact.org (World Future Council)
FIT Rates = Empirical Values

FIT revision: provides opportunity to adjust FIT prices & depression towards objective/ target

Grid Parity

- FIT changes to net-metering when grid-parity is achieved (real cost + external cost for fossil fuel and nuclear)

Important to prepare local RE industry prior to start of FIT regulatory framework
Towards benefiting local industry
Promotes quality & cost reduction
Meeting expectation
Healthy growth

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<thead>
<tr>
<th>RE Technologies</th>
<th>Germany 2007</th>
<th>Italy 2009</th>
<th>Malaysia 2009/2010</th>
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<tbody>
<tr>
<td>Retail Electricity Tariff (average)</td>
<td>0.28 US$/kWh</td>
<td>0.24 US$/kWh</td>
<td>0.08 US$/kWh (Subsidised)</td>
</tr>
<tr>
<td>Solar PV</td>
<td>2.4 x retail</td>
<td>2.7 x retail</td>
<td>5.5 x retail</td>
</tr>
<tr>
<td>Wind</td>
<td>0.4 x retail</td>
<td>1.7 x retail</td>
<td>1.1 x retail</td>
</tr>
<tr>
<td>Biomas</td>
<td>0.5 x retail</td>
<td>1.2 x retail</td>
<td>1.1 x retail</td>
</tr>
<tr>
<td>Biogas</td>
<td>0.4 x retail</td>
<td>1.0 x retail</td>
<td>1.1 x retail</td>
</tr>
<tr>
<td>Mini-hydro</td>
<td>0.5 x retail</td>
<td>1.2 x retail</td>
<td>0.8 x retail</td>
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<tr>
<td>Cost to consumers (% of retail tariff)</td>
<td>4.8%</td>
<td>7.8%</td>
<td>2% (proposed)</td>
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</tbody>
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C2: financial & technical support
C1, C2: quality installations (ISP accredited training)
C4: quality products,
C1: quality services
C1: consumer awareness & appreciation
C3: grid access, net-meter, license
C2: monitoring
C1: policy makers
C3: RE-FIT (study)

Competency Training
- ISP accredited training
- 10 days: theory, practical, exam

Approved Service Provider Scheme
- License valid for 1 year with annual review.
- Only for companies.
- Staff passed ISP training.
- Use certified electrician.
- Company shall be financially sound.
- Company shall have workers insurance and public liability insurance.
- Company shall follow APVSP Industry Best Practice Guidelines.
- Company shall abide by the APVSP Code of Conduct.

Complemented by Quality Assurance Scheme

Quality Control Centres
Inverter Quality Control Centre
Mounting Structure Quality Control Centre
Performance Monitoring

Communicate Internationally
- Exchange of knowledge & lessons learned
- Accelerate learning process & minimise mistake
- Friendship

Awareness & Understanding – Most Critical

Towards achieving RE Targets

<table>
<thead>
<tr>
<th>Year</th>
<th>Solar PV</th>
<th>Solid Waste</th>
<th>Mini Hydro</th>
<th>Biogas</th>
<th>Biomass</th>
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<tbody>
<tr>
<td>2015</td>
<td>375 MW (6%)</td>
<td>54 TWh (3%)</td>
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<tr>
<td>2020</td>
<td>2,005 MW (15%)</td>
<td>11.2 TWh (5%)</td>
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<tr>
<td>2050</td>
<td>3,484 MW (13%)</td>
<td>25.6 TWh (13%)</td>
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Cumulative RE Installed Capacity

2050: 11.5 GW (34%) 25.6 TWh (13%)
Comparison between FiT and Quota System

<table>
<thead>
<tr>
<th>Feed-in Tariff (FIT)</th>
<th>Renewable Portfolio Standards (RPS)</th>
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<tbody>
<tr>
<td>Proven to be the cheaper option</td>
<td>Less successful in achieving targets (e.g. UK, Sweden)</td>
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<td>Performance based incentive - encourages reliable operation</td>
<td>Involves tradable green certificates which are unpredictable in prices</td>
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<tr>
<td>Provides long-term investment security and returns</td>
<td>Must have a penalty system</td>
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<tr>
<td>Creates stable and predictable revenue to pay for cost of investment</td>
<td>Requires strong enforcement mechanisms</td>
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<td>Depression and periodic reviews allow and stimulate price reductions due to technological advances (e.g. solar PV)</td>
<td>No clear identification of source of funds to meet additional costs</td>
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<td>Simple to implement – specific RE developments and FIT costs can be pre-determined and planned in advance</td>
<td>Unpredictable RE prices and costs because of bidding and trade</td>
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<tr>
<td>Encourage smaller and distributed power producers and new industries – greater number of jobs</td>
<td>Usually only one RE technology would be promoted</td>
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<tr>
<td></td>
<td>Usually only bigger company (with resources) would be interested to become developers</td>
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