Current Financing Models and Issues in the Malaysian Green Technology Projects


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Abstract: This paper aims to present Malaysia’s green technology development, focusing on the current green financing models to start-up projects including the government initiative such as Green Technology Financing Scheme (GTFS). The issues and barriers in financing the green projects based on the current financing models are also highlighted. The alternatives financing routes such co-development partnership, lease back and build and sell structures are also discussed with their advantages and disadvantages. The potential of using clean development mechanisms (CDM) in financing the green projects especially the renewable energy projects and the use of energy efficiency projects as alternative financing route to sustainable development are also emphasized. Finally, the policies and measures required to assist the green financing investment are presented.

Keywords: green technology, financing, renewable energy, energy efficiency, policy

1.0 Introduction

The over-dependence on fossil fuels and over-exploitation of earth’s natural resources have now become obstacles for sustainable development in many countries [1]. Global energy related emissions of CO2 are expected to rise from 20.9 Gt in 1990 to 28.8 Gt in 2007. It is then projected to reach 34.5 Gt in 2020 and 40.2 Gt in 2030, an average growth rate of 1.5% per year [2]. Countries like UK, US, Japan and Singapore have pushed forward many best practices for sustainable development and environmental management while pursuing economic and social development. Similarly to Malaysia the Government has successfully identified green technology as one of the emerging driver for sustainable development which also addressing the economic regeneration and environmental issues [3]. Malaysian industries have since risen to involve and fully capitalize green growth through the green technology perspective in a favorable policy environment and subsequently helping to realize the vision of turning Malaysia into a prime green economy hub in the ASEAN region. Green Technology Financing Scheme (GTFS) was announced in National Budget 2010 and was first given towards supporting green technology and green building [4]. As for April 2010, a total of 44 applications had been received and 19 being approved at an estimated financing of RM 518 mil (USD 152 mil) with carbon reduction estimated at about 1.12 mil tonnes [5]. The total projects approved are very low and the total financing is very limited due to barriers hindering the financial model. The alternative financing routes shall be explored to increase the involvement of green technology projects and to increase the players in green growth.

Thus, this paper examines the issues and challenges in funding the green technology projects, alternative financing options to realize the green technology projects such as solar photovoltaic projects, alternative financing through clean development mechanism (CDM) of renewable energy projects and other alternative financing route such as energy efficiency financing. The suggested policies and measured are also highlighted.

2.0 Finance Models for Greentech Start-up
The issues in financing greentech projects were related to the global demand, new economic growth sectors, investment focus and green technology potential in Malaysia but without denied that there are great potential, but nor without challenges. The areas which can explore more likes biomass for instance converting biomass to energy, solar power - converting of solar power to energy, mini hydro, Light Emitting Diode (LED) - conversion of traditional light to LED based, waste treatment and organic or bio-fertilizer. All of this renewable energy has their challenges to produce. For instance, biomass needed sustainable supply for feedstock, heavily reliant on mill production, price escalating arising from higher demand, increasing logistics and transportation cost and competition from other uses of biomass such as industrial cellulosic sugar. While hydro power’s challenges like development upstream or vicinity and the probability that the river will dry up is big. Solar power also has their own challenge like short optimum solar energy supply (10 am- 4 pm) and energy supply is not high even in hot weather because hot is not necessary optimum. Challenges in LED has their own story like facing stiff competition, the price falling rapidly, no success model for Private Finance Initiative (PFI) and high replacement cost. These challenges and obstacles have been overcome by Green Technology Scheme (GTFS). The fund size is RM 1.5 billion with 2% interest rate, 60% Credit Guarantee Corporation (CGC), 40% bank exposure, 30 to 60% collateral and almost nil net of collaterals. It was designed for contract/project to generate bio-fuel/energy from sustainable sources and supply to utility company or contract/ project to provide energy efficiency/ performance contracting services and products or contract / project to provide products and services to green technology sector and companies or contract/project to develop/supply/implement green tech products and/ or services to public/private sector. It has been lunched since 2010 and utilization fund is 55%. But, this scheme has their own restraints in funding green technology projects such as below:

- i) High capital investment on the part of vendor and no risk on part of sponsor.
- ii) PFI model benefiting ‘sponsor’.
- iii) Model not proven to succeed in the long run.
- iv) Economics, alone, is not a sufficient market driver.
- v) Appropriate technology will ensure short pay-back period.
- vi) Not all pilot plant works in a full scale production.
- vii) Must provide alternative supply for feedstock to keep plant operating.
- viii) Banks to finance Capital Expenditure (CAPEX) must be willing to finance Working Capital.
- ix) Lack in expertise in all areas of plant management including logistics, client relationships, quality control, marketing and administration.
- x) Clearly green technology projects are suitable for those with deep pockets.

3.0 Alternative Financing in Solar PV Power Projects

Solar photovoltaic (PV) projects are bankable because they are reliable, predictable and safe if executed in a proper manner. Main characteristic of PV projects is reliability, which meant that technology is simple and passive, maintenance is light and module life time 25 years. The second characteristics of PV projects is predictable due to sunlight is stable through the years; energy yield is predictable and regular; output directly linked to quality of modules/ inventers and O&M costs are stable followed by third characteristic which is safe in terms of returns are known well in advance and economical reality does not vary too much from simulations.

However, projects are often not realized because the right financing options are not available, as a result it is required to explore alternative financing. Alternative financing options for solar plants have been tailored to local needs and conditions such as Asia region with current industry issues like disaggregated: sector which is growing rapidly; small; inexperienced developers but significant funds available using Co-Development Partnership. While for United States region with current issues such as profitability dependent on tax rebates and projects are small using Lease Back Structure and Europe region with current industry issues like declining market prices and large market that requires fast action using Build and Sell (Bridge Financing) (Figure 1) [6].

These alternative financing have advantages and challenges to comply and should be used as a creative option to traditional financing when conditions are right. The co-development partnership structure that has been tailored in Asia
as illustrated in Figure 2 and it is good for the project that are in the early stage which is required quick decision. The concept was structured for the 30 MW solar farm in Thailand. In this structure, the partnership is developed between Engineering, Procurement and Construction (EPC) Company and investor to jointly develop the projects. The investor is involved much earlier than regular projects and is given the first right of refusal on investment rights. Based on the assessment of the concept, it was identified that this alternative financing gave the advantages such as focus on the long term financial viability for project, projects start faster, financially attractive for stakeholders and it can minimize the costs of matching individual projects with investors. However, the challenges were the defined or limited project scope and required strong, trusted relationship.

The second structure was the lease back structure which was implemented in the United States (Figure 3) [6]. In this financing structure, strategic partners found a development company which owns a portfolio of small solar projects which cannot be financed through traditional debt. Then, the bank provides a credit facility which enables them to own project assets and lease them back. The advantages of this structure were good for pipeline or small projects, smooth requirement for cash over project life, funds working capital. Shifts risk to bank rather than investors and investors can share development margin and control the project. This structure is suitable and good for projects that are small and disaggregated. One of the project implemented using this financing structure was a 500 kW commercial rooftop project in California. However, the difficulties in this financing structure were its too expensive and require equity investor with strong financials.

Figure 2. The co-development partnership matches project concepts and financing at an earlier stage in the project lifecycle [6].

The third structure was the build and sell which has been tailored in Europe (Figure 4)[6]. This structure is suitable and good for the projects that are large and has selling stable markets and clear investors. One of the projects tailored with this structure was a 100 MW wind farm in Italy. In developing this structure, the EPC Company will fund all development through equity and then sell the project at market price to investors after construction. This structure creates demand, good as a single project ownership and fast decision making. The challenges identified were introduced market risk, no leverage (100% equity financed), no risk sharing and the old project compete with new projects which are less expensive.

Figure 1. Alternative financing options for solar plants have been tailored to local needs and conditions [6].
Figure 3. Lease back structures shift the risk of small projects to lenders by giving them ownership over project assets [6].

Figure 4. Build and sell models are more appropriate for large projects with stable selling prices [6].

4.0 Alternative Financing in Energy Efficiency Projects

The other alternative route for developing financing model is by using energy efficiency projects. Based on the trend in the Asia Pacific Region, the potential of energy efficiency sector share is 8% with the value at US$ 373 million which is the 4th higher after biomass, wind and solar (Table 1) [7]. Whilst the total global deal value and percentage share of energy efficiency is 10% with the amount of US$3,740 million in 2010 and increased to 19% with the value of US$ 10,104 million in 2011 (Figure 5) [8]. Thus, the contribution is very promising in the future as it will generate more value of money and also reduce the greenhouse emission.

Table 1. Asia Pacific Deals by Sector (Final Renewable Deals 2012 Outlook 2011 Review, PwC) [7].

Globally, the greenhouse gas emissions (GHG) grew from 30 billion tons in 1990 to 38 million tons in 2005 with an average annual growth of 1.8%. However, GHG emissions from the Asia-Pacific region increased much faster, with an average annual growth rate of 2.8% to reach almost 17.5% billion tons in 2005 [8]. In 2005, East and North-East Asia accounted for the largest share of the Asia-Pacific region’s emissions at 53.3%, followed by South and South-West Asia at 18.8%. Global energy needs are estimated to grow more than 50% with developing countries contributing to nearly 3/4th of this increase. In order to meet the target of achieving universal access to modern energy services by 2030, investments of US$ 756 billion (or US$36 billion per year) is needed.

The global energy intensity has decreased by 1.4% p.a since 1990. Largest reduction found in the regions with the highest energy intensities (China,
CIS and India). Industry and power generation accounted for almost half of that reduction (about 30% and 15%, respectively). Per capita energy consumption to 2030 is likely to grow at about the same rate as in 1970 – 90 (0.7% p.a) but the energy per unit of GDP continues to improve globally and at an accelerating rate. The acceleration is important as restrains the overall growth of primary energy.

The recent regulations in energy efficiency are development of Comprehensive Light Emitting Diode (LED) Performance, Safety, and Quality Standards in February 2012. India became the first country in the world to comprehensively regulate LEDs. The energy saving opportunity is about 33 TWh/y if LEDs replace the present stock of compact fluorescent lamp (CFLs) and incandescent bulbs. Subsequently, the Canada’s Minimum EE Standards is officiated in April 2012, establishes new minimum energy efficiency standards and associated reporting and compliance requirements for electrical compliances such as:

i) Standby performance of compact audio products, television and TV combination units (and reporting only of TV on mode) and video products;
ii) External power supplies;
iii) Digital TV adaptors;
iv) Electric boilers; and
v) Single package vertical air-conditioners and heat pumps.

Energy efficiency firms attracted nearly $1.1 billion in venture capital in 2010, almost double that of 2007. The major industries expected to increase the energy efficiency industry are:

i) Lighting
   - LED is the fastest growing market at a compound annual growth rate (CAGR) of 14.9% from 2011 to 2016.
   - The U.S. is expected to be the biggest market of LED in 2016; however Asian region will witness the highest growth rate at a CAGR of 16.6% from 2011 to 2016.

ii) Building
   - Building EE technologies and services market to stand at $87.0bn in 2012.

iii) Green IT

- Pike Research expects the growth in cloud computing revenue to continue worldwide between now and 2015 at a CAGR rate of 28.8%, with the market increasing from $46.0 billion in 2009 to $210.3 billion by 2015.
- The reduction will drive total data centre energy expenditures down from $23.3 billion in 2010 to $16.0 billion in 2020, as well as causing a 28% reduction in GHG emissions from 2010 levels.

iv) The ESCO industry in Asia Pacific is poised to grow
   a. From $3.0 billion in annual revenue in 2009 to $18.5 billion by 2016.
   b. 421% increase from 2010 levels.

### 5.0 Carbon Credit Financing

Mitsubishi UFJ Morgan Stanley Securities (MUMSS) which is a brokerage and investment banking arm of Mitsubishi UFJ Financial Group (MUFG) reported that they have consulted and registered over 60 clean development mechanism (CDM) projects in Asia and Latin America [9]. Currently, until September 2012, 104 projects have been recorded; 63 registered and 22 issuances (Table 2). Carbon emission factor (CEF) has succeeded in getting 8 new emission calculations and monitoring methodologies approved by United Nations (UN). CDM also has been a major instrument of carbon credit generation in the world with over 3,300 projects have been registered since after the first CDM projects approval by the CDM Executive Board (EB) in Nov 2004.

Current CDM project status issued is 1,744 projects with the total carbon emission reduction (CER) at 1,004,980,253 ton/year (Table 4) [9]. Total Malaysia’s projects is 28 with CER at 3, 286, 685 ton/year. Most of the CDM projects listed are from methane gas reduction from palm oil mill effluent (60.4%) and renewable energy project from palm oil biomass (16.2%), then followed by fuel switching (6.3%), other renewable energy (6.3%), energy efficiency (3.6%), electricity generation (non-renewable) (1.8%) and others (5.4%) (Figure 6) [9]. However, based on the project type the highest CER is contributed by the renewable energy projects from palm oil biomass (1,125,162 ton/year) and then followed by electricity generation from non-
renewable (775,138 ton/year), fuel switching (753,968 ton/year), methane gas reduction from palm oil mill effluent (34,134 ton/year), energy efficiency (34,134 ton/year), other renewable energy (20,895 ton/year) and others (170,327 ton/year) (Figure 7) [9].

**Table 3. Track Record in Clean Development Mechanism (CDM) as of September 2012 [9].**

<table>
<thead>
<tr>
<th>Asia</th>
<th>LatAm</th>
<th>No. of projects</th>
<th>Project status</th>
<th>No. of projects</th>
<th>Project status</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>8</td>
<td>Registered</td>
<td>7</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Thailand</td>
<td>21</td>
<td>Registered</td>
<td>4</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>12</td>
<td>Registered</td>
<td>3</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Malaysia</td>
<td>8</td>
<td>Registered</td>
<td>2</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Mongolia</td>
<td>2</td>
<td>Registered</td>
<td>2</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Philippines</td>
<td>10</td>
<td>Registered</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Korea</td>
<td>7</td>
<td>Registered</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>India</td>
<td>4</td>
<td>Registered</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Vietnam</td>
<td>4</td>
<td>Registered</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Cambodia</td>
<td>2</td>
<td>Registered</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2</td>
<td>Registered</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
<td>Registered</td>
<td>1</td>
</tr>
</tbody>
</table>

The largest increase in the number of registered projects was recorded in 2009. While more than 2,200 projects are still in the pipeline aiming for a CDM registration approval process. But, CDM also has difficulties such as i) complicated approval process; which meant it take a long time; high costs of approval and unforeseeable factors delaying registration; ii) unbalanced project type distribution; renewable energy projects and CH₄ reduction projects constitute about 80% of all projects and very few projects in some categories for example transportation or energy efficiency, and iii) low price and demand of CER.

**Table 4. Clean Development Mechanism (CDM) Project Status as of September 20, 2012 [9].**

<table>
<thead>
<tr>
<th>Status</th>
<th>Number of projects</th>
<th>Estimated CERs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered</td>
<td>4,674</td>
<td>458,676,427</td>
</tr>
<tr>
<td>Requesting Registration</td>
<td>148</td>
<td>19,435,649</td>
</tr>
<tr>
<td>Request for Review</td>
<td>21</td>
<td>2,734,803</td>
</tr>
<tr>
<td>Validation</td>
<td>6,071</td>
<td>747,982,711</td>
</tr>
<tr>
<td>Total</td>
<td>10,914</td>
<td>1,418,631,627</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Status</th>
<th>Number of projects</th>
<th>Total Issued CERs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered</td>
<td>111</td>
<td>6,203,987</td>
</tr>
<tr>
<td>Requesting Registration</td>
<td>1</td>
<td>163,990</td>
</tr>
<tr>
<td>Request for Review</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Validation</td>
<td>111</td>
<td>10,369,296</td>
</tr>
<tr>
<td>Total</td>
<td>223</td>
<td>16,837,153</td>
</tr>
</tbody>
</table>

The role of government also should be defined clearly with appropriate policies, long terms complement of initiatives that become very important factors for green tech to start up, moving forward and success. The issues about energy efficiencies have been raised because of the potential for existing technologies that have been produced neglected the importance of energy efficiency.

Main problems in financing is timing and targeting which need to look at new innovation in investment such as energy efficiency (EE). Energy efficiency firms attracted nearly $1.1 billion in venture capital.
in 2010 which is double time of 2007. LED is fastest growing market at a CAGR of 14.9% from 2011 to 2016. Building EE technology and services market to stand at $ 87 Billion in 2012 [9].

The issues highlighted are about the knowledge and technologies transfers to business scales by reducing the risks using financial schemes. The proposed solution is to understand the needs of the technologies in order to have the right vision about the technologies transfer before using financial schemes.

In order to move forward, Governments need to commit and also provide the following:

- Overarching policy framework combining mandatory and voluntary policies and strengthening enforcement;
- Promote greater awareness of EE;
- Play an essential role as integrator of the value chain;
- Establish funding mechanisms to jump-start EE financing, particularly in the short term;
- Institutionalize standard-selling and enhance professionalism within the industry by creating proper accreditation and certification standards;
- Publicizing more accurate information about EE product suppliers and energy service companies (ESCOs); and
- Remove other barriers that distort markets such as energy subsidies

However, the Business needs to:

- Move towards an integrated value chain approach where suppliers extend their service portfolio to offer complete solutions (auditing, installation, maintenance and financing solutions);
- Develop innovative financing vehicles for EE projects by collaborating with financial institutions and by developing expertise in EE project financing;
- Increase awareness of EE and enhance professionalism of the industry from within;
- EE suppliers and ESCOs should adopt a more active role in promoting EE and in professionalizing the industry from within by setting standards and benchmarks.; and
- Multinationals should act as catalysts by bringing in the best practices from their experiences in other countries.

7.0 Conclusion

In summary, conventional financing models still relies on the strength of a company to provide financing and the green technology projects requires some time before it can prove its business model. However, to accelerate the growth of green tech sectors, more alternative financing approaches are required. In funding green technology start-ups, several conditions are necessary such as:

i) Requires unconventional approach
ii) Emphasis on project viability not on strength of the company
iii) Understanding technology and its challenges
iv) Strong management team ensures success

In order to reach a successful financial close of a project, the project has to be developed properly. The key factors identified for successful financial closure as below:

i) Bundle projects together (eg. 5MWp).
ii) Make the proper simulations anticipating environment changes (sensitivity analysis).
iii) Define precisely exit strategies.
iv) Identify the right partners.
v) Allow fast and transparent access to information.
vi) Anticipate timing sequence of events and delays.

References


