Key Success Factors In Implementing Renewable Energy Programme in Malaysia

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Abstract: - The high demand of energy of urban development has intensified the flow of energy through the ecosystem. Due to the high energy prices, depletion of fossil fuels and global warming impact of fossil fuels combustion, researchers from all over the world have been urged to develop renewable energy technology. Most of the renewable energy technologies are still not able to compete with the conventional energy sources. Policies and strategies need to be in placed to create renewable energy market and make the technologies feasible. The widespread application of this technology can be enhanced by employing several strategies namely (a) establishment of renewable technology information services, awareness and capacity building programmes (b) development of renewable technology market enhancement, infrastructure development and demo projects (c) improvement of policy and financial frameworks supportive for renewable energy technology market sustainability (d) establishment of competitive local solar technology manufacturing industries, enforcement of international standards for solar technology components and enhancement R&D programmes

Key-Words: - Renewable energy programme, key success, strategy, project implementation

1 Introduction

Energy is not just a basic element which is needed to sustain human life but also to improve the standard of living in an urban society. Energy is needed to operate the socio-economic development activities such as the production of food and water, clothing, shelter, transportation, communication and other services. The high demand of energy of urban development has intensified the flow of energy through the ecosystem. Along with urbanisation, the energy sector has expanded to meet the demands of growing economies and rising affluence. As reported by the IEA [1], the main resources for the world energy supply and consumption in 2005 are still fossil fuels. The three major fossil fuels are crude oil or petroleum, natural gas and coal. Fossil fuels are finite and non-renewable resources. They take millions of years to form and due to the rapid demand, the reserves are being depleted much faster than the new ones are being formed. Furthermore, combustion of fossil fuels is chiefly responsible for urban air pollution, regional acidification and the risk of human-induced climate change. Hence, rising energy use can worsen pollution, and mismanagement of energy resources is then harming the ecosystems.

Hence, due to the high energy prices, depletion of fossil fuels and global warming impact of fossil fuels combustion, researchers from all over the world have been urged to develop renewable energy technology. Most of the renewable energy technologies are still not able to compete with the conventional energy sources. Policies and strategies need to be in placed to create renewable energy market and make the technologies feasible. This paper discusses on the key strategies to success in implementing renewable energy programme.

2 Overview of Renewable Energy Project Implementation Flow

The main objective of the renewable energy project is to provide reliable and clean energy services to the end users. Successful implementation of renewable energy projects very much depends on the management of risks to achieve financial closure of the projects. The risks are Country Risk, Political Risk. Legal risk , Foreign Exchange Risk, Force Majeure Risk, Operating and Technology Risk (technical risk), Construction and Sponsor Risk, commercial risk, Economic, Inflation and Environmental Risks, financial risk, fuel supply risk,

Project Counterparts such as the Government, Sponsors, funding institutions, contractors and operators play important roles in mitigating risks and ensuring the success of the project implementation. Their linkages and relationships between these counterparts are as illustrated in Fig. 1.

Risk Management

Financiers will look at opportunities to minimize the possible impact of exposure to risks. They will build in structures to protect themselves from potential downsides due to identified project risks. Hence the key to successful project financing is the management of the many types of risks involved.

Financiers will organise structured risk analysis of various components in a risk matrix to "off-load" sufficient risks to acceptable third parties so that their own risk exposure is reduced to what they consider an acceptable level in order to arrive at bankability and viability of renewable energy projects. Project risks are assessed and quantified, and if deemed unacceptable the application will be rejected. However, if the degree of risk is within ‘acceptable bounds’ the possible down sides will be assessed and a suitable risk premium introduced (equivalent to an insurance premium) to increase the bankability of the projects.

Risks are interrelated and vary from project to project. The main types of risk are as follows:

- Country, Political.
- Operating and Technology Risk (Technical Risk)
- Construction and Sponsor Risk
- Technology Risk
- Economic, Inflation and Environmental Risks
- Legal, Foreign Exchange and Force Majeure Risks

Operating and Technology Risk (Technical Risk)

Upon commissioning and commercial operation, the financier will be primarily concerned with the project operator who will maintain the plant and to meet the projected operating budget. The financier will review the proposed operations and maintenance budget, number of qualified personnel and other resources.

The financier will evaluate Technology risk for little understood or new technologies to ensure high availability and efficiency of the plant in order to generate the much needed revenue for debt repayments. Financiers see Technology risk as a Sponsor risk. Financiers love to fund renewable energy projects employing technology or systems with more than 5 years of proven reliable operation.

The financiers normally will require additional guarantees from project sponsors (back-to-back with large and creditworthy equipment supplier guarantee) for new technologies in the form of private insurance or bank bonds in which the financier is named on the policy.

Commercial scale demonstration projects can help improve the perception of technology risk. This is why grants from multilateral aid agencies or government may be applied at this stage in order to reduce risk by offsetting the financial exposure of the project to sponsors, the lenders and the investors.

The financiers will also insist on all or any of the following additional securities/guarantees:

- Appointment of independent Engineering & Project Management Consultant to be part of the due diligence process.
- The application of proven technology (i.e. shown to operate in broadly similar applications).
- Strong experienced sponsor with significant track record (and ideally an equity stake).
- The key Sponsors are bonded into the project at least until the debt has been fully repaid.
- Provision of longer term performance guarantees and warranties.

- Adequate insurance cover from a reputable insurance company.

Construction and Sponsor Risk

The key construction risks are: never-built, non-completion; late completion; and cost over-run. There are situations where the loans are completely drawn, the cash spent, but the project uncompleted. Obviously, without a completed project there is no cash flow and the loans will never be repaid and investors and financiers will never receive a return. Sponsor risk relates to the risk that the project sponsors or project developers are not substantial and not reliable.

Construction and sponsor risks are relatively easy to mitigate because the risks are there only during the construction period. These risks are minimised, and appropriately assigned to the contractors by negotiating a turnkey (ideally fixed price) construction contract which specify who bears the risk of non-completion, late completion, or the possibility of cost over-run. Therefore the financier will require the sponsors to commit equity (or potentially secured assets), so that the sponsor has a serious interest in successfully completing the project. The financier can also insist the developer to provide specified levels of support until satisfactory operational completion has been certified. Construction risks can also be mitigated through the employment of independent engineering project management consultant to oversee the successful completion of projects.

Commercial, Inflation and Environmental risks

Financiers perform commercial risk analysis as an early benchmark to assess the sufficiency of Debt Service Covering Ratio (DSCR) of the project. Normally DSCR should exceed 1.5. The financier will analyse all the project assumptions, consider if the projections are reasonable and then consider the likelihood that the project can maintain sufficient cash flow to meet its operating costs and loan repayment obligations. The cost of commercial risk analysis is usually borne by the sponsors and included in the loans.

The equity investors are only interested in the project's projected economic performance. Their key measurement is usually the Internal Rate of Return (IRR) (the return to equity on the money it invested) (it is the discount rate which equates the Net Present Value of the cash flows to zero). The IRR also takes account of the time value of money.

Commercial risks are usually analysed in 'real terms', i.e. net of inflation. For example if the project expenditures, receipts and loans are all in the same currency, there is relatively low inflation risk. However, if elements of the scheme are linked to different inflationary escalators (e.g. differences between input and output prices), then commercial risks are significant. For cross-border transactions where each country's inflation rate may be different the risks are also significant.

The financiers want to protect themselves against environmental liabilities. Therefore the lenders will require that all planning, environmental and other consents and approvals have been obtained. Environmental Impact Assessment (EIA) (including anticipated changes in future environmental regulation for risks to the project's future economic operation) will be required in light of local, multinational bank and World Bank guidelines.

Although these risks are particularly difficult to offset as they may not become apparent until well into the debt repayment period, yet there are a series of tools available to help manage/minimise these, including the following:

- Sponsor guarantees to support debt servicing obligations until the first commercial operation date or to support the entire debt servicing period (depending on the outcome of the risk assessment).
- Proceeds accounts are escrow accounts (in a chosen currency to minimise short-term foreign exchange fluctuations) set up to carry a cash balance that covers debt servicing requirements, typically for six months. Such arrangements can be denominated Standby letters of credit can be put in place with the output purchaser to support the off-take contract whilst ensuring their commitment.
- Provision of a local government guarantee.

- Other collaterals or assets may be provided as security in addition to the proposed project assets as a gesture of commitment.
- Syndication arrangements involving other experienced financial institutions to spread the risk.
- Entering into well understood (fixed) contracts which are viewed as essentially binding on all parties and that either assign or share the risks.
- Having in place clearly stated pricing adjustment mechanisms which guarantee to cover the main variables.
- Putting in place a regime where operating performance subject is the subject to ongoing review.
- The application of financial arrangements such as debt covenants and debt service reserves.
- Planning and designing the plant so that it is capable of exceeding current national standards (although exceeding these standards by too much may be perceived as costly and unnecessary over-engineering).

Country, Political, and Force Majeure Risks

International banks set lending limits to a particular country. Obviously, a more unstable country (such as a country at war or suffering from political instability) warrants a lower country limit.

Political risks are inherent in doing business especially in developing countries, especially in cross-border transactions. Political risks can be incurred through the change of government, government inaction or direct action (of both national and local government). Inaction involves failure to issue permits as needed, or government failure to enforce local legal provisions. Examples of direct action include the following:

- preventing the local partner from making payments on foreign loans;
- changing the foreign-exchange or currency-use rules thereby preventing foreign banks from recovering their loans;
- introducing regulations affecting the price or the mechanisms for the sale of electricity;
- nationalising, or privatising, the industry or project;
- political violence, such as war or terrorism.

Legal Risks

Legal risks exist where laws are uncertain or can change. Lenders will seek legal opinions from local counsel to ensure that all the project contracts are legal, valid, binding and enforceable under the relevant laws, and the manner in which the security taken by the lenders could be enforced.

Foreign Currency Exchange Risk

So long as the capital expenditures, revenues, operating expenses and loans are in the same currency, there is no foreign exchange risk. If this is not the case, the financiers will be asking the following questions:

- is the exchange rate likely to move against the project so that it will not be able to meet its payment obligations (to its debt or foreign suppliers),
- is the project guaranteed the ability to convert its local currency income into foreign currency (at a favourable rate) to meet the external obligations?

Force majeure risk

Force majeure risk means a risk that is beyond the control of all parties to the project, typically 'acts of God' and severe weather, and possibly including industrial action. Often, a force majeure clause is used to excuse any party's performance in the face of occurrences beyond their control.

Country, political, legal, foreign exchange and force majeure risks are very difficult to mitigate completely. Fortunately some of these risks are common to those of wider economy. Therefore financiers will adopt some of the following approaches to minimize risks:

- Policies which encourage private sector involvement, particularly where this involvement will improve risk management and promote risk transfer.
- Government support or guarantee for the promotion of renewable energy projects. These instruments are very useful risk mitigants, especially if linked to some form of guarantee. This will help potential investors ascertain the degree to which individual schemes are

compatible with national programmes or aspirations.

- The project can be insured against political risk. National export credit agencies (ECAs) normally provide this to their exporters, with limits of course. Multilateral development agencies such as the World Bank and their Multilateral Investment Guarantee Agency provide more extensive insurance cover. Private insurers such as Lloyds of London also provide same services for a premium.
- To protect themselves against fluctuations in interest rates and currency exchange rates, the sponsor may be required by the lenders to enter into 'hedging contracts'. These are financial devices used to reduce losses as a result of future price movements.

The government not only plays the role as the regulator that issues licenses but also as the promoter that encourages more renewable energy projects by providing incentives to reduce the capital costs and payback period of the investments. The government should consider giving financial aids to deserving renewable energy projects to enhance their viability and bankability. For example the government can give tax credits. A tax credit is generally more valuable than an equivalent tax deduction because a tax credit reduces tax dollar-for-dollar, while a deduction only removes a percentage of the tax that is owed. Investment Tax Allowance (ITA) for capital expenditure over the duration of loan. ITA allows the company to recover capital expenditure for the approved renewable energy projects over a period of time, say 5 years. The government should also provide conducive environment to welcome investors, manufacturers to localize manufacturing of components and systems that will help reduce capital expenditures of renewable energy projects.

The government should also provide catalysts for research and development in localizing renewable energy technology in Centers of Excellence located in either institutions of higher learning, universities or research institutions.

Structured conventional energy project finance has been relatively commonplace in supporting the development of new energy facilities over the past 20 years. This is achieved through disaggregating risk and parceling it out to specific parties who can accept that risk. Obviously project finance becomes easier for the 10th deal of the exact same type of renewable energy projects. However, it is still very challenging to use project finance approaches to fund development of projects using innovative renewable energy technologies or commercial arrangements.

Accordingly, project finance has been rather problematic for renewable energy projects. Financiers and financial institutions structuring the deals were either unfamiliar or uncomfortable with the risks posed by new renewable energy technologies, most of which have not been in commercial operation. This lack of project finance capacity and experience has thus been a major barrier to the widespread commercialisation of otherwise viable commercial-scale renewable energy technologies projects.

There are now financial professionals with deep knowledge of the true abilities of renewable energy willing to amass capital to deploy in sponsoring the development of renewable energy projects. There are also other boutique project financiers specializing in renewable energy opportunities. These and other financiers will join the mainstream to capitalize on the rapid growth potential uniquely offered by the renewable energy sector. In fact the credibility of renewable energy projects improved when Goldman Sachs announced the purchase of Zilkha Renewable Energy in 2005.

Then the project will engage reputable contractors for the engineering, procurement construction and commissioning. The project will also engage reputable companies for the operation, repair and maintenance throughout the loan period or even the concession period. Finally, the end users will need to pay for the services and hence generate the revenue for the project. The revenue will then be used for repayment of loans and monthly operation and maintenance expenditures. Although the profit of the whole project

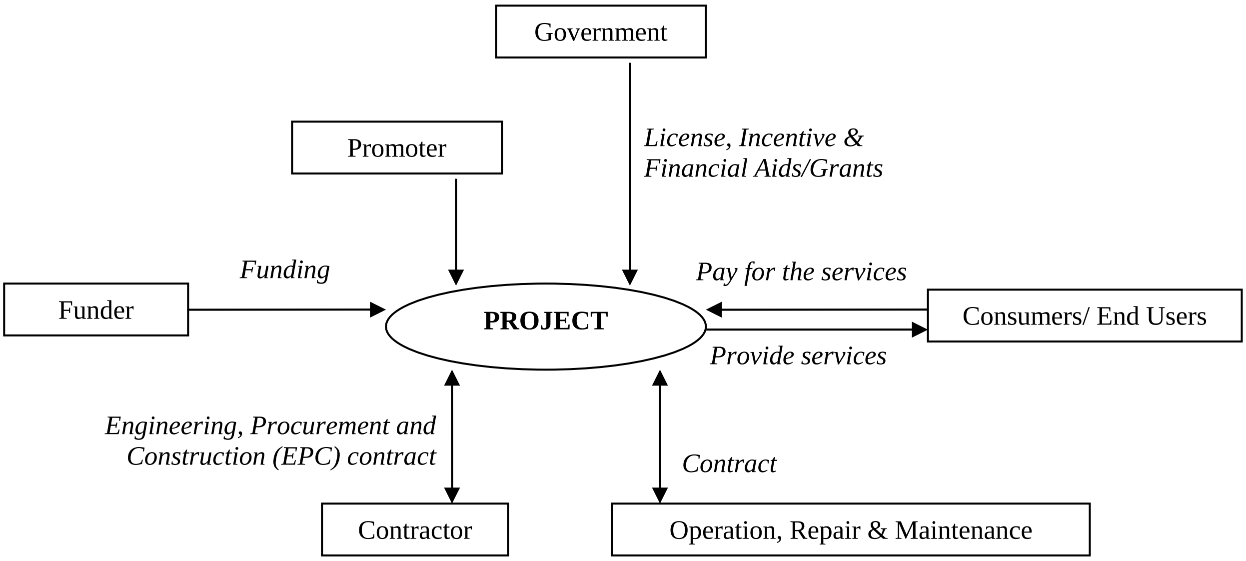

Fig. 1. Overview of Renewable Energy Project Implementation

depends on the tariff of the services, the tariff needs to be justified on a balance point whereby it is affordable for the consumers and at the same time generate sufficient revenue to ensure the sustainability of the project.

3 Energy Profile and Renewable Energy in Malaysia

3.1 Energy Supply in Malaysia

The main energy supply sources in Malaysia are fossil fuels. Crude oil and natural gas were the dominants in 2005 and are projected to remain as the main energy supply sources in 2010 [2]. If the energy production level in the country is insufficient to support the energy supply, the country will need to import fuels from other countries and the risk to become a net energy importer will be high. Thus, sufficiency of energy fuel supplies is a key aspect of sustainability. Although historical data and Fig. 2 show that Malaysia is able to meet the energy needs at current production levels (greater than 100%), the self-sufficiency rates (the ratio of primary energy production to total primary energy supply) are decreasing.

3.2 Energy Consumption

Energy is needed for different economic sectors to support the daily operations such as production, manufacturing and services. From Fig. 3, in 2005, the two sectors that consumed energy the most were the industrial and transport, where 60% of the energy source was from the petroleum products, followed by 18% of electricity consumption.

3.3 Renewable Energy in Malaysia

As discussed in the previous sections, the energy supply and consumption of Malaysia are still highly dependent on the fossil fuels. The Government is always concerns on the importance of renewable energy resources as the alternative energy sources for fossil fuels to preserve the environment. During the Eighth Malaysian Plan (8MP) (2001-2005), the Government announced the expansion of the four-fuel strategy (oil, gas, hydro and coal) by including renewable energy as the “fifth” fuel [12]. In line with the policy of promoting the utilization of renewable energy sources, in the Ninth Malaysian Plan (9MP) (2006-2010), a total of 350MW generated from renewable energy and connected to the grid has been set as a target to be achieved by 2010 [2].

However, as of May 2008, only 12MW is generated from renewable energy: 10MW from empty fruit bunches and 2 MW from biogas. This accounts for only about 3.4% of the 2010 target. The utilisation of renewable energy sources is still limited due to some existing constraints such as high subsidies for fossil fuels, low incentives for renewable energy projects, insecure supply of biomass, high capital expenditure with long payback period and generally financial institution and investors shy away from renewable energy projects

4 Key Strategies to Success in Implementing Renewable Energy Programme

The widespread application of this technology can be enhanced by employing several strategies namely (a) establishment of renewable technology information services, awareness and capacity building programmes

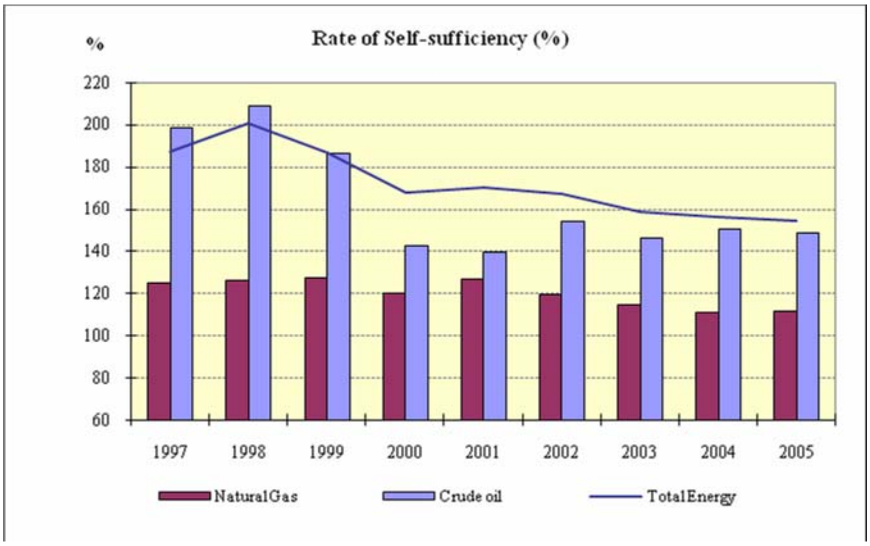

Fig. 2. Rate of self-sufficiency of energy supply in Malaysia - Source: [3]-[11]

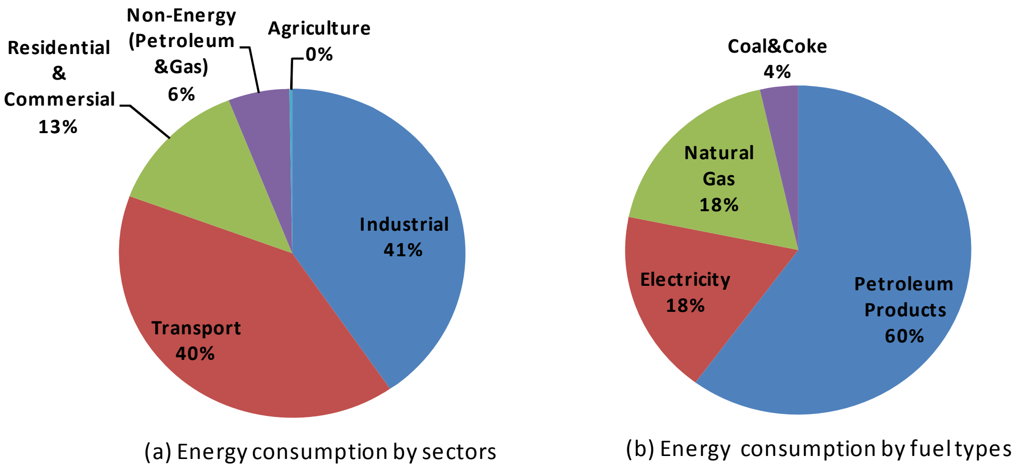

Fig. 3. Energy consumption in 2005 in Malaysia - Source: [11]

(b) development of renewable technology market enhancement, infrastructure development and demo projects (c) improvement of policy and financial frameworks supportive for renewable energy (in particular solar) technology market sustainability (d) establishment of competitive local solar technology manufacturing industries, enforcement of international standards for solar technology components and enhancement R&D programme. Moreover, these strategies should be addressed in an integrated manner.

4.1 Renewable Technology Information Services, Awareness and Capacity Building Programmes

This will enhance the level of understanding and awareness in an extensive education campaign and capacity building programme. The level of awareness for the public in general and especially policy makers will be raised to the point that they understand the technology, are aware of its true benefits and ecological significances, understand the purpose and appreciate the functions of the technology. Policy makers shall further appreciate the possibilities for the market and the industry and are able to introduce suitable policy, regulatory initiatives and special electricity tariff for grid interconnection. Activities such as establishing information services, seminars, workshops and capacity building programme will improve the level of competency and quality of work of the service providers, architects, engineers, investors and financial institutions and developers. In addition, establishment of the information resource centre, database and website will provide the end users the required information for installing renewable energy technologies.

4.2 Renewable Technology Market Enhancement and Infrastructure Development

The technical feasibility and economic viability of solar technology can be addressed by implementing a number of demonstration projects. These projects will further provide a wider level of acceptance and better understanding of the technology and its benefits. The demonstration projects will also pave the way for providing first hand experiences for improvements in the training and skills of the stakeholders as well as increased efforts in R&D activities. For Building Integrated Photovoltaic (BIPV), the demonstration projects (500 kWp) and a national kick-off roof-top programme (>1 MWp) similar to many programmes implemented in Japan and Germany will provide adequate knowledge and experience to architects, engineers, project developers, policy makers and other stakeholders for Malaysia's future sustainable implementation of subsequent follow-up programme. As for other renewable energy projects, several demonstration projects such as solar hot water heating system for hospitals, hotels and catering services should be implemented. Others include solar industrial process heat in the drying, food and textile industries.

4.3 Renewable Technology Policies and Financing Mechanisms Programme

Appropriate, proactive and integrated plans and policies will facilitate the development of a conducive business environment and thus enhancing further cost reduction of the renewable technology. Based on various targeted research activities, a compilation of policy, legal, institutional, financial and fiscal measures will be proposed to the government of Malaysia. These frameworks will enable the formulation of a national renewable energy target in the 10th Malaysian Plan (10MP) (2010-2015), supported with suitable and customized mechanisms for the local condition. In order to achieve the target, financial aides play important roles.

Funders need to support infrastructure projects by providing loans to project developers. The government may provide soft grants, incentives and lower taxes to reduce the capital investment cost and hence encourage more renewable energy projects. Another financial aid is through the trade of carbon credit. Developing countries such as Malaysia is eligible to benefit through the Clean Development Mechanism (CDM).

4.4 Industry and R&D Enhancement Programme

The future of solar energy technology in Malaysia is promising. Four manufacturers of solar modules have decided to locate their factories in Malaysia due to educated workforce, attractive tax incentives and availability of silica oxide.

First Solar, a manufacturer of solar modules has invested US$150 million to set up 4-line advanced manufacturing plant in Kulim Hi-Tech Park, Malaysia with an expected minimum nameplate capacity of 100 MW using thin film technology.

Denmark Solar Industry (DSI), a world leader in the fabrication and manufacture of solar panels and solar renewable energy savings products, will relocate its plant in Kemaman, Terengganu, Malaysia with an initial investment of RM200 million. Kemaman was chosen due to availability of high-grade silica oxide the main raw material to produce solar cells. The investment would be increased to RM1bil when the facility is fully operational in 2008. DSI has targeted to export four million solar cells to Denmark by July 2008

German solar cell manufacturer Q-Cells AG has decided to set up a new production line in Malaysia and expand thin-film module production in its Calyxo subsidiary with a designed maximum capacity of more than 300MWp costing at least

$307 million. The first construction phase, with a capacity of 160MWp, is scheduled to ramp up production in Q1 2009. Calyxo, producing thin-film modules based on cadmium telluride technology, will more than double its present production capacity from 25MWp to 60MWp. The additional production will start to ramp up in Q2 2009.

SunPower Corporation, a Silicon Valley-based manufacturer of high-efficiency solar cells, solar panels and solar systems, announced plans to build its next solar cell fabrication plant in Malaysia. The new manufacturing facility is expected to be constructed in two phases, with the first phase comprising 14 solar cell production lines with a nameplate capacity of 40 megawatts each. After completion of phase two, the plant, Fab 3, is estimated to achieve materially lower capital and operating costs by including solar panel manufacturing, as well as dedicated ingot growing and wafering by partner companies. Solar cell production in Fab 3 is likely to begin in 2010, with the integrated site development planned to start later 2008. SunPower will launch its manufacturing operations with its industry-leading 22 % minimum rated Gen 2 solar cells, and expects to add production of higher-efficiency Gen 3 solar cells at a later date. The scale and breadth of Fab 3 campus in Malaysia will be a core element of technology and manufacturing roadmap responsible for 50 % cost reduction plan by 2012.

These investments will require more human resource capacity in R&D and manufacturing. Partnership and/or joint ventures with international companies will upgrade local companies, R&D institutions and the technical infrastructure for testing and certification facilities will be established to ensure only high quality commercial renewable energy products for the local and international market. Relevant standards must be updated and new guidelines must be drafted providing technical assistance to the industry.

The outcome of these strategies will strengthen the industry, consumers and policy/decision makers. These will ensure the increase of solar technology installed capacity and the long-term cost reduction of the technology via the increase in demand, economies of scale and competitive local manufacturing.

5 Conclusion

In order to achieve the renewable energy target and bringing the technology into competitive market, policies need to be in place by implementing appropriate strategies. The strategies should cover the pipelines from the foundation based such as R&D development until the commercialisation stage that are able to compete with the conventional energy technology.

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