

2021

《Green Finance Implementation Guidebook – Logistics Industry》



HKQAA

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Chapter 1. 《Green Finance - SME Self-Assessment Guide》

A. Background

1. Definition of Green Finance

The regulatory details of green finance in Hong Kong are similar with those in the Mainland. Except for listed green bonds which are regulated by the Listing Ordinance, green loans are administered by financial institutions in accordance with the licensing ordinances and requirements of The Hong Kong Monetary Authority (HKMA). The HKMA is committed to promoting green and sustainable finance to address the risks of climate change. The HKMA considers climate change to be one of the major risks to human well-being. How the banking and financial systems operate clearly has an impact on how climate change risks are managed and mitigated.



The HKMA will promote green and sustainable banking in three phases.

- Phase I: Establish a common framework with the industry to assess the current Greenness Baseline for banks. The HKMA will also work with international organizations to provide technical support to local banks on the principles and methods of conducting "green checks";
- Phase II: Consultation with the industry and other stakeholders on the regulatory expectations or requirements for green and sustainable banking, with a view to establishing a set of specific objectives for enhancing the green and sustainable development of the banking sector in Hong Kong;
- Phase III: Once the objectives have been established, implement, review and evaluate the banks' progress in this area.

The HKMA is asking the banking industry to analyze the impact of climate change on them, implement timely countermeasures, and accelerate the development of green business. The HKMA is actively participating in international forums to support the global development of green finance. As a member of The Network for Greening the Financial System (NGFS), the HKMA participates in the Network's working groups on how to integrate climate risk and other green and sustainability factors into regulatory frameworks and macro-monitoring.

The banking industry has responded positively to the HKMA's initiative to expand the focus of green finance from large listed enterprises to non-listed enterprises and even SMEs and will introduce policies and products to facilitate SMEs' access to loans. With the support of green finance, SMEs can develop new green businesses or improve the environmental performance of their products and business processes, which will not only increase their business volume and revenue and reduce the cost of production or service delivery, but also build a green brand and expand their customer base to companies or consumers who are concerned about environmental protection and climate change.

Hong Kong Institute for Monetary and Financial Research (HKIMR), established by the HKMA, released a report on November 24, 2020, entitled " The Green Bond Market in Hong Kong: Developing a Robust Ecosystem for Sustainable Growth ", an applied finance study. The report describes the current state of the green bond market in Hong Kong and globally and illustrates the benefits of green bonds for issuers and investors. Among the findings, existing market participants identified the strengths of the Hong Kong market as a large pool of international investors, supportive policies, the presence of many socially responsible issuers, and the implementation of transparent ESG disclosure. 71% of existing issuers surveyed and 100% of existing investors surveyed said they plan to participate in Hong Kong's green bond market in the future. SMEs can follow the trend of green finance and seize the opportunity of green capital from investors to prepare for green projects and help their business development.



China has provided a guiding and clear view on the definition of green finance, which will not only affect the orientation of green business and capital investment priorities of domestic financial institutions in Hong Kong. It can also provide a good definition of green finance. The People's Bank of China (PBOC) and the China Banking Regulatory Commission (CBRC) jointly promulgated the "Opinions on the Implementation of Environmental Protection Policies and

Regulations to Prevent Credit Risks", which stipulates that environmental protection departments, PBOC, CBRC and financial institutions at all levels should put the State Council's implementation of the decision and environmental protection policies and regulations on their important agenda. Strengthen the cooperation and linkage between environmental protection and financial supervision departments, promote credit security by strengthening environmental supervision, support environmental protection with strict credit management, strengthen economic restraint and supervision of enterprises' environmental violations, raise the awareness of environmental rule of law in the whole society, promote the completion of energy conservation and emission reduction targets, and strive to build a resource-saving and environment-friendly society. It also stressed the need to strictly monitor the environment and credit management of new projects in accordance with the requirements of environmental laws and regulations. In addition, the environmental protection departments at all levels strictly approve the environmental impact assessment of construction projects and strengthen the management of environmental protection facilities in construction projects. "Environmental Protection Law," Article 41 came into force on 1 January, 2015 to supplement the construction of pollution prevention facilities, should be designed, constructed and put into operation at the same time as the main project. Pollution prevention facilities shall comply with the requirements of the approved environmental impact assessment file, shall not be dismantled or idle. The concept of "Three simultaneities" in other green projects also has good reference value.

The above regulations bring out the basic definition of green finance.

1. The enterprises financed must comply with applicable national and local environmental protection laws and regulations to avoid credit risks arising from environmental protection violations;
2. The funds should be used to support environmental protection industries and projects, and should bring benefits to the environment; and
3. To conduct environmental impact assessment and implement "Three Simultaneities" management.



The Hong Kong Quality Assurance Agency (HKQAA), with the support of the Hong Kong Government, launched Hong Kong's self-developed "Green Finance Certification Scheme" in

2018, which includes a definition of green finance and green projects. SMEs can use the information and documents mentioned above to prepare green projects to meet the requirements of financial institutions.

2. Green Standards

With regard to the second definition of green credit, the guiding catalog of green industries listed in the circular issued by the PRC National Development and Reform Commission, the People's Bank of China, the Ministry of Industry and Information Technology and other departments on February 14, 2019 - "Circular on the Issuance of the Guidance Catalogue of Green Industries (2019 Edition)" (發改環資 (2019) No. 293) provides a suitable reference for the industries in which green finance is to be used.

As for assessing whether the use of loans by enterprises supports environmental protection projects, industries and projects that support environmental protection are generally referred to as eligible green projects in the capital market. The International Capital Market Association's Green Bond Principles (GBP) and the Loan Market Association's Green Loan Principles (GLP) provide the same indicative categories of eligible green projects. Compared to the existing national entities and international principles, the main difference between the People's Bank of China's Bulletin [2015] No. 39 Annex "Green Bond Support Project Catalogue" issued in 2015 and the GBP/GLP is the clean use of coal.

B. Evaluation Process

1. Purpose of self-assessment

Green Finance Self-Assessment is an assessment exercise conducted by enterprises or their delegates in accordance with these guidelines and using the tools provided by the Green Finance Knowledge Sharing Online Platform.

The purpose of the self-assessment is to help SMEs understand whether they can finance their businesses through green finance, so that they can continue to grow their businesses while making some contribution to the environment and climate change. It involves three levels, including the readiness of the company's policies and capabilities, the rationale for supporting green projects, and the risk management of implementing the projects. Each dimension has different assessment focus and assessment items as follows.

Layer	Evaluation Highlights
<ul style="list-style-type: none"> Readiness of the company's policies and capabilities 	<ul style="list-style-type: none"> Company Sustainable Development Strategy Sustainable Development Foundation Culture Promoting Sustainable Development Results
<ul style="list-style-type: none"> Rationale for the Green Project 	<ul style="list-style-type: none"> Use of Funds Raised Estimated Environmental Benefits
<ul style="list-style-type: none"> Execute project risk management 	<ul style="list-style-type: none"> Environmental Compliance Ability to complete green projects

2. Preparation for self-assessment

Before conducting the self-assessment, SMEs need to clearly identify the environmental laws and regulations that apply to their business and ensure that they are in compliance with the relevant requirements. In addition, collect (1) the technical specifications and indicators of the green project for which green funding is desired and (2) the practical experience of previous projects that are the same as or similar to the green project.

3. Login to the Green Finance Knowledge Sharing Online Platform (www.greenfinance.hk)

4. Activate the Green Finance Self-Assessment Tool

a) Corporate sustainability strategy, including

- The linkage between the company's development and the solution of today's important environmental issues; and
- The company's written commitment and plan for sustainable development.

b) A culture of sustainability fundamentals, including

- Internal communication of the importance of environmental protection to the business; and
- The level of employee recognition of and participation in corporate sustainability.

c) Past achievements in promoting environmental protection, including

- Results of environmental benefits achieved (e.g., carbon footprint, water footprint, energy consumption, pollutant emissions, waste/waste reduction, etc.); and
- Measurement of environmental benefits achieved.

d) Use of proceeds, including

- Green project attributes; and
- Dedicated funds.

e) The environmental benefits expected to be generated upon completion of the project, including

- Environmental benefit key performance indicators (KPIs); and
- Measurement of the environmental benefits to be generated.

f) Environmental compliance, including

- Compliance management; and
- Compliance performance

g) Ability to complete green projects, including

- Project experience;
- Personnel capacity and skills; and
- Environmental impact assessment



Chapter 2. 《Green Project Selection and Evaluation and Green Technology Details》

A. Environmental Challenges Facing

There are different environmental challenges in today's logistics industry, environmentally harmful by-products are inadvertently generated during the transportation or preparation process.

In terms of environmental concerns or impacts, there are three major concerns:

1. Greenhouse gas generation in transit

The Hong Kong Special Administrative Region is encouraging the phasing out of Euro IV vehicles with the announcement of an incentive scheme to recall around 40,000 Euro IV vehicles by 2027. In addition, since July 2017, the emission standards have been tightened from Euro V to Euro VI for all new vehicles, except for diesel private cars, light buses and light motorcycles. The increased requirements of the EU standards, in other words, require numerous countries to develop more effective technologies for diesel vehicle emissions reduction.

The main objective of Euro VI is to reduce environmentally harmful emissions from engines.

To find more information about Euro VI, please refer to [https://www.epd.gov.hk/epd/tc_chi/environmentinhk/air/prob_solutions/cleaning air at road.html](https://www.epd.gov.hk/epd/tc_chi/environmentinhk/air/prob_solutions/cleaning_air_atroad.html)



2. Use of non-renewable fuels

Currently, refrigerated containers are powered by non-renewable fuels and driven by diesel generators in a constant speed Vapor Compression Refrigeration Cycle (VCRC) system. Its main problems are emissions, limited battery power and high maintenance cost of diesel system and so there is an urgency to identify a green and sustainable solution to solve these problems.

Solar power is also a proposed solution in this project. Solar power has great potential to replace diesel engines in powering refrigerated containers, and the second part of this article will explore the benefits of Euro VI and solar power for the logistics industry and the environment.

3. Waste generation such as tires or oil sludge

According to statistics, in 2019, China's waste tires generated about 330 million, equivalent to a weight of more than 10 million tons, and the annual scrap generated by the volume of waste tires is still growing at a rate of 6% to 8%.

The situation of waste tires being disposed of indiscriminately and occupying official land often occurs, and, the recycling profit of waste tires is relatively small, and few companies are willing to carry out recycling except for the government-funded environmental park recycling companies. If more subsidies could be given to more private companies, it would improve the situation of many waste tires stuck in Hong Kong, as the Mainland tightens its import requirements every year.

If recycled, used tires can be turned into playground cushions, oil refining or buffering materials, but since oil prices have been low in recent years, it's not very attractive to many recycling companies.

To find more information about recycling or disposal of used tires, please refer to <http://env.people.com.cn/BIG5/n1/2020/0727/c1010-31799112.html>

B. Green Project Selection and Evaluation

The use of Euro VI vehicles, solar power, or recycling waste such as tires all have their own merits. The following will analyze the above three examples in more depth and from more aspects as a guide for selecting or evaluating green projects.

1. Legislative aspects

Judging from the past legislation, it is only a matter of time before Euro 6 is implemented and becomes widespread. If the budget is sufficient, and with the mature technology of the industry, purchasing Euro VI vehicles is a relatively worthwhile and long-term investment, and the decision will not be affected by improvements or changes in legislation or guidelines for the time being.

As for solar panels, except for those installed in high-rise buildings, they may need to be inspected by the fire department or building department to make sure they meet the specifications. For those installed on trucks, a conservative estimate is that they will only need to meet the standards of the Transport Department and be audited (not even necessary) before they can be used on trucks. However, in the long run, it is unlikely that there will be any major changes to the law that would affect the installation or use of solar panels.

Waste materials such as tires, the number of waste tires produced in Hong Kong every day is very large, the indiscriminate disposal of land pollution and environmental health problems, but if the incineration will produce a lot of black smoke, dioxins and other air pollutants, affecting health, is also illegal. Therefore, if recycled, there will be a certain market for playground cushions,

oil refining or buffering materials. The law, through recycling, so as to avoid the risk of violations caused by the generation of waste, of course, the law will also have relative requirements on the quality of recycled to qualify as such things as artificial reefs.



2. Technology aspects

From the investment point of view, there will be no technical problems because the factory has already obtained sufficient technical certification and maturity before mass production. However, since it is not yet widespread, not all maintenance technicians in Hong Kong have mastered the technology, so it is recommended to consult more with the factory before purchasing.

If you use solar panels, maintenance and repair are relatively mature, mainly by referring to the technical guidelines for installing solar panels in buildings. Of course, in terms of installation, since it is an innovative technology, the installation of solar panels on loan cabinets to supply electricity to the refrigeration system requires more experiments and trials to support the manufacturing process.

The recycling of waste will involve professional technology, from hardware to manpower also need to re-examine, from the initial capital investment to maintain the quality of technical training, also cannot be ignored. The good thing is that the recycling technology is now very mature, so generally speaking, the stability and quality of the recycled products produced will be higher.

3. Investment return

Euro VI vehicles may cost a little more than the old ones due to the new engine technology. However, in the long run, the fuel consumption will be reduced during the service life of the vehicle, and with the large vehicles and the logistics industry's demand for longer distances, the savings will be very impressive.

By the same token, the use of solar panels will eliminate the use of diesel for refrigeration

power generation. A detailed analysis of the costs and benefits will be presented in the case studies in the Solar Panel Technology Study article.

As for the investment in recycled waste, it is very much based on the market value of the recovered product, such as the oil refining mentioned earlier, which will affect the profit depending on the market price of oil.

4. Environmental and social impact

The use of Euro VI vehicles is a scheme that has the greatest responsibility for environmental protection, and the previous emission standards were focused on nitrogen dioxide, so the gasoline engine was once regarded as the main culprit of environmental damage. Until one day everyone understood the harm of nitrogen oxides to the environment, know will produce nitrogen oxides of diesel engines, the degree of destruction than the production of nitrogen dioxide gasoline engines more serious, so it has been tightening the international standards. From Euro V to Euro VI emissions, nitrogen oxides have been greatly reduced by 55%, followed by the improvement of efficiency, which will also reduce the use of diesel, reducing unnecessary emissions, which also reduces the emissions of nitrogen dioxide. The reduction of greenhouse gases is beneficial to both nature and humans.

The use of solar panels for cooling will eliminate all emissions of gases harmful to the environment and human beings from the use of diesel for power generation, reduce greenhouse gases, protect the earth, and reduce the dependence on and demand for non-renewable diesel fuel. It will also create a green image for the brand of the logistics industry, thus attracting more interest from companies interested in developing environmental business and attracting investors.

As for putting resources in the collection service, it can reduce the burden of landfills and the manpower for waste disposal, which can also contribute to the environment and society.

Reference :

<http://dspace.unive.it/bitstream/handle/10579/17392/871747-1235998.pdf?sequence=2>

https://www.researchgate.net/publication/316703394_Building_criteria_for_evaluating_green_project_management_An_integrated_approach_of_DEMATEL_and_ANP#pf4



There are several additional basic factors to consider when choosing a green project:

1. Size of the green project department: The number of members or staff determines the size of the green project that can be planned and affects the operability of the project when it is running.
2. Green competitiveness of suppliers: For example, suppliers can improve the quality of supply chain management, increase corporate social responsibility in the supply chain, upgrade the environmental management system of the supply chain, etc.
3. the geographical location of the company: for example, the convenience of the location of the company, the convenience of access to resources, etc.
4. Weather or climate impact: For example, if a company is located in a city where sunlight is scarce, the challenge of solar panel power generation may be more difficult.

C. Green Technology Details - Euro VI Diesel Vehicles

1. Market situation

Euro VI is the sixth generation of standards developed by the European Union to reduce vehicle emissions and thereby reduce harm to the environment or people. The program was launched globally in September 2015.



2. Scientific Background

The Euro IV standard is to control nitrogen oxide emissions from diesel models at 250 milligrams per kilometer, while under the Euro VI standard, the maximum level of nitrogen oxide is 80 milligrams per kilometer, narrowing the standard to more than three times.

Looking at the NO_x limits in the Euro VI standard, it will require manufacturers to utilize newer post-treatment technologies such as exhaust gas recirculation. Other technologies, such as selective catalytic reduction (SCR), may be added to meet the new carbon monoxide (CO), hydrocarbon (HC) and particulate matter (PM) limits.

In terms of test methods or procedures, in Euro IV, diesel engines are tested using either the European Stability Cycle (ESC) or the European Load Response test (ELR). For the Euro VI standards, these tests were changed and replaced by the World Harmonized Stationary Cycle (WHSC) and World Harmonized Transient Cycle (WHTC), Off-Cycle Emissions (OCE) tests, and In-Service Compliance (ISC) tests.

In addition, as mentioned above, ammonia (NH₃) concentration in diesel vehicles (using WHSC+WHTC engines) is also limited to 10 ppm.

In summary, the heavy-duty Euro VI standard places greater emphasis on the actual NO_x and respirable particulate emissions from diesel trucks, with a revised test procedure for heavy-duty vehicles that uses a world-unified transient cycle, new NH₃ and particulate matter limits, and stronger on-board diagnostic requirements.

3. Advantages

The main goal of Euro VI is to reduce NO_x emissions. The requirements for overall, carbon monoxide, hydrocarbon and particulate matter PM_{2.5} are also more stringent. Compared to pre-1995 vehicles, Euro VI diesel vehicles emit 96% less nitrogen oxides and 99% less particulate matter. The reduction in pollutant emissions from Euro V to Euro VI is about 80%, as NO_x is one of the major greenhouse gases that contribute to poor weather and environment.

The stringent emission limits of the nitrogen oxide standard also place strict limits on ammonia because it involves reductive treatment. As a result, more types of pollutants will be noted and strictly regulated in Euro VI.

As ultra-low sulfur fuels become more widespread and abundantly available, a direct switch from Euro IV to Euro VI, rather than a gradual switch to Euro V, would provide more benefits. For some countries, we have already seen some huge leaps from Euro III to Euro VI. This change directly precludes the difficulties of Euro V, in terms of emissions control, because there is no new testing cycle for Euro V and no convenient conformity requirements like there are for Euro VI. In many countries, such as India, the maturity of manufacturers and the completion of technology has made most countries or localities ready to skip Euro V and move directly to Euro VI.



4. Cost requirements

Assuming an upgrade from a 4-pipe 1.5-liter diesel engine without emission controls to the Euro VI standard, the estimated cost would be an average of HK\$10,000 per vehicle, with the price depending largely on the size of the engine. The addition of a Diesel Particulate Filter (DPF) and the huge improvements to the Selective Catalytic Reduction (SCR) system account for most of the incremental costs, and we will ignore some indirect costs here, such as some instant diagnostics and installation of emission sensors. However, comparing benefits and costs, the net benefit of the Euro VI standard is approximately six times greater than that of the 2050 Euro V standard over a 15-year period. According to a recent ICCT study, for every \$1 invested in the standard, there will be approximately \$3.60 in health benefits, including the additional costs associated with public health and adverse environmental impacts, such as the increased operating load of air conditioners due to higher temperatures.

D. Green Technology Details – Solar-Powered Refrigeration Containers

1. Market situation (Existing technologies and pain points)

Refrigerated containers are commonly used for transporting perishable goods such as meat, produce, dairy, and medical supplies. An external power supply from the trailer is required for the refrigeration system of the containers to control and maintain an internal temperature ranging from -65°C up to 4°C during transportation. The amount of power consumed by refrigerated containers depends on factors such as external temperature and sunshine availability, which impact internal temperatures. Using a 40ft high cube refrigerated container as an example, solar radiation of about 700 W/m² could cause the surface temperature of the container to reach up to 35 °C, making maximum power consumption as high as 7.5 kW/h for maintaining the steady cold of the container during noontime.

Another challenge with delivering products over long distances is the storage of the products prior to their transportation. Many farms are in highly remote areas far from accessible electrical grids. Once harvested, produce must travel relatively long distances to reach the nearest refrigeration facility and collection point for further transport to their end destination. This leads to the need for highly quick operations to reduce any potential spoilage, resulting in stress for both the agriculture and logistics parties.

Currently, refrigerated container technology uses a constant speed Vapor Compression Refrigeration Cycle (VCRC) system driven by a diesel power generator. The issues with it are the emission of environmentally unfriendly exhaust gases, batteries limited in power, high maintenance cost of diesel systems, and the noise generated by the engines, which may disturb residential areas at night. The need for identifying a green and sustainable solution to address these issues is eminent. Solar PV technology is one such solution which has potential to replace the diesel engines in powering refrigerated containers.

2. Scientific background

The following innovative green technologies are implemented in solar-powered refrigeration (SPR) containers.

a) Vacuum panels installation

Heat moves along the walls of a refrigerated container via conduction, convection, and thermal radiation; conduction contributing 99% of the total thermal load. To minimize this, vacuum panels are placed in the walls before polyurethane, the material that is used in insulation of refrigerators and freezers, is applied. If the overall container wall thickness remains the same with vacuum panels installed, the heat transfer value will drop from 86 BTU/hr/°F to 41 BTU/hr/°F.

b) Variable speed compressor operation

Use of variable speed operation technology can significantly improve the performance of

a refrigeration system. As PV power is varied during the day depending on weather conditions, the refrigeration system must be able to efficiently adapt to varying power levels. This can be achieved using a variable speed compressor and a control system that allows the refrigeration system to maintain maximum efficiency at both high and low operating speeds, as well as during the transient conditions between power levels. If the compressor is unable to operate at variable speed, it will not operate when the sun availability is low or will waste power when the available power exceeds the compressor's needs.

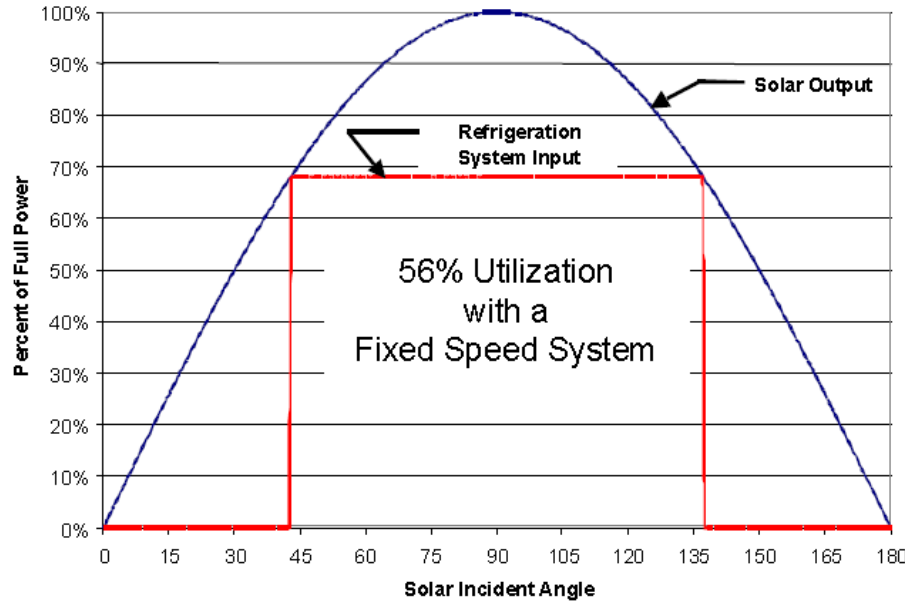


Figure 1: Utilization of Solar Energy with a Fixed Speed Compressor System

c) Phase Change Material (PCM) storage technology

Latent heat storage using PCM is one of the most efficient methods to store thermal energy, with such materials having demonstrated improvement in the thermal performance of compact cold storage facilities. PCM are materials which generally have low melting points and change their phase by absorbing the latent heat from the system to maintain the temperature of system.

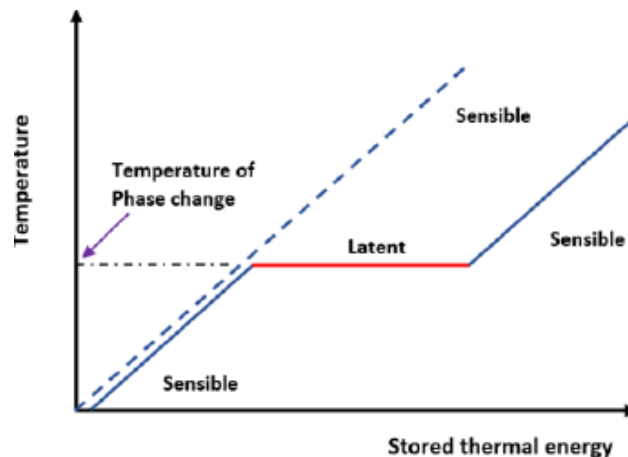


Figure 2: Working Principles of Phase Change Material

Experimental results shows that with the application of PCM, internal temperatures are 1-4 °C lower than without PCM, in case of frequent door openings. One important advantage of PCM systems over battery systems is that PCM systems weigh two thirds LESS with an equivalent thermal cooling effect. A 40ft high cube refrigerated container would save about 2000 lbs of weight using the PCM system.

d) Anti-reflection (AR) coating solar panels

Solar PV panels are the most direct way of harvesting solar radiation and converting it into electricity without emission of air pollutants or greenhouse gases. However, the theoretical upper limit of the conversion efficiency of these panels is estimated at around 30%. To increase the efficiency of solar PV panel power generation, the panels can be coated with an AR film which would improve the panel's transmittance by reducing reflection on the surface of the glass. The Figures 3a & 3b showcase how the texture of the film, possessing omni-directional nanostructure arrays, can reduce reflection and increase light absorption, increasing power generation efficiency by 7-10%.

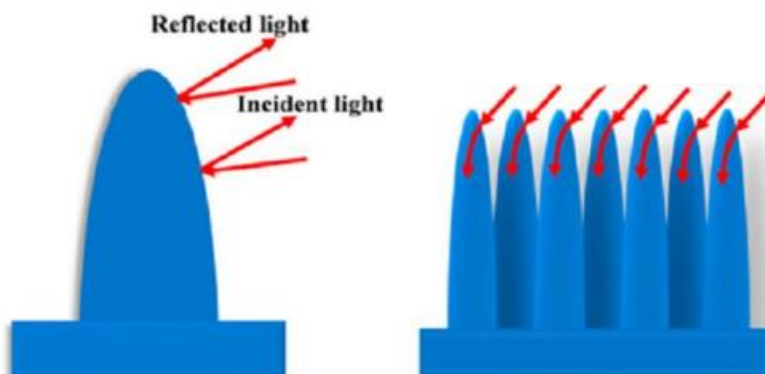


Figure 3a: Light interaction with macrostructure

Figure 3b: Light interaction with nanostructure array

3. Benefits

SPR containers have several benefits for logistics and agriculture companies, making the transport and storage of perishable items feasible. Current SPR containers require combustion of diesel to provide power which is environmentally unfriendly and unsustainable. Therefore, having the energy supply being generated using solar panels and immediately used by the refrigeration unit is an optimal method; the energy being green, renewable, and continuous. In the long run, the overall cost of operating an SPR container vehicle can be reduced. Although a diesel hybrid would still require the purchase of diesel, the amount would be reduced significantly, saving around 50% of fossil fuels. In either case, the costs of installation of an SPR container will be easily offset by saving on purchasing energy sources and storage batteries.

Another benefit is that such technology can be used in more remote areas where access to a central power grid is unavailable. This would relieve the stress on both the agriculture and logistics companies to collect and transport the crops at exceptional speeds to prevent spoilage. The crops could now be collected and put in an SPR container storage facility as they await transport to their final destination. This methodology would bring extensive economic benefits, as fewer crops would be spoiled and more could be sold.

4. Key functions & specifications

An SPR container consists of 8 components (refer to Figure 6): charging controller (1), a storage battery or PCM (2), a solar cell (3), an inverter (4), a refrigeration unit (5), an air cooler (6), managerial system (7), and an automatic electrical control device (8).

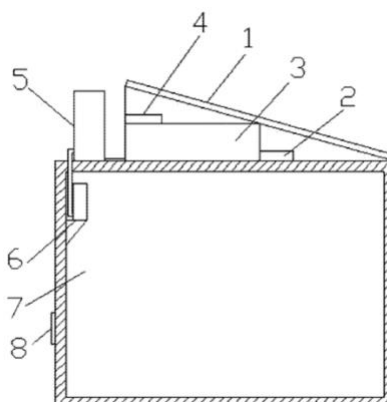


Figure 4: Diagram of an SPR container

In terms of operating specifications, consider three cases found in the table below.

	Case 1	Case 2
Internal Volume (m3)	20	40
Power Consumption (kW)	3	5
Solar Power (kW)	4.8	9.6
PCM Capacity (Ah)	600	1000
Dimensions (m)	6.5 x 2.3 x 3	12.8 x 2.3 x 2

5. Show Case

The following table is the estimated building cost of a 40ft high cube SPR container:

Items	Comment	Estimated cost
Solar Panels	5700 watts @ \$12/watt installed	\$68,400
Vacuum Panels	2000 sq.ft @\$32/sq.ft	\$64,000
Electric Refrigeration Unit with variable speed compressor		\$96,000
PCM storage	3.5 kW Generator	\$20,000
Diesel Unit	Removal of the Diesel Unit	(\$148,200)
	Total	100,200

Life expectancy of 20 years is assumed for a 40ft high cube SPR container and equipment, as solar panels are now available with warrantee periods of 20 to 25 years. The following table is the summary of the estimate of diesel cost, scheduled & unscheduled maintenance, and major service events.

Items	Calculated Info	Annual Cost	20 year cost
Diesel Cost	2000 gallons/year with @ \$12/gallons	\$24,000	\$480,000
Scheduled Maintenance	Oil and air filters	\$1,950	\$39,000
Unscheduled Maintenance	Alternator	\$4,860	\$93,600
Engine replacement	Lifetime: 20,000 hours		\$46,800
		Total	659,400

The estimated operating cost of the SPR system should be significantly lower than that of the diesel system. The major maintenance/cost items for the solar powered system are i) Refrigeration system service, ii) Electronic system component replacement, and iii) Auxiliary Power Unit fuel/service.

Items	Calculated Info	Annual Cost	20 year cost
Refrigeration system service	\$800/year	\$800	\$16,000
Electronic system component replacement	Oil and air filters	\$800	\$16,000
Auxiliary Power Unit fuel/service	\$9.75/hr with 500 hrs annually	\$4,875	\$97,500
		Total	129,500

Chapter 3. 《Building a Green Finance Framework & Green Technology Application Notes》

A. Background

The International Capital Markets Association (ICMA) published its first Green Bond Principles in 2014, which included the overall environmental, social and governance framework of green bond issuers as one of the issues that investors in green bonds may consider. In June 2018, the Green Bond Framework appeared in the External Review section of the Green Bond Principles, recommending an external review to confirm that an issuer's green bond framework is consistent with the four core components of the Principles. The Green Bond Framework was further identified as a key recommendation to improve transparency by recommending that issuers summarize relevant information in the context of their overall sustainability strategy and the four

core components of the Principles. Overall, there are five key recommendations for an issuer's green finance framework, namely, company profile, use of proceeds, process for evaluating and selecting projects, management of proceeds and reporting.



B. Details of the Green Financial Framework

1. Company Profile

In order to introduce a company to investors or those who may be interested in its green projects, it is important to remove the concerns of stakeholders about "greenwashing". According to Investopedia, a U.S. website, greenwashing is defined as "the process of conveying a false impression or providing misleading information about how a company's products are more environmentally friendly. Greenwashing is considered to be a claim that lacks evidence to deceive consumers into believing that a company's products are environmentally friendly. Green financing can be a marketing tool to build a company's green image, but it is critical to ensure that a strong link is established and maintained between green finance initiatives and the company's overall sustainability strategy. It may seem difficult to establish such a strategy and require professional advice, but it can actually be put into simple terms. This linkage can directly and easily describe how sustainability is one of the key success factors in achieving a company's long-term business success.

The ability to generate business ideas, control operating costs and build reputation are key elements of the small and medium-sized enterprise (SME) survival toolkit, and it should not be difficult to find good reasons to associate green projects with them. SMEs in the logistics industry can look to industry pioneers like DHL to develop their sustainability strategies.

DHL's sustainability commitment includes three key commitments, including clean operations for climate protection. The theme of the commitment is to achieve net zero emissions by 2050, which is supported by the Sustainable Aviation, Green Last Mile Delivery and Linehaul, Carbon Neutral Buildings and Green Product Groups (web link: <https://www.dhl.com/global-en/home/about-us/sustainability/environment.html>). The whole program may be too heavy for SMEs, which can actually pick and choose one or more of the appropriate elements. For example, for logistics companies in Hong Kong, the green last mile delivery is a commendable green initiative.

In addition to a sustainable strategy, an attractive company's resume allows readers of its green finance framework to appreciate the company's ability to "walk the talk". As a rule of thumb, references to a company's business history, innovation, customer portfolio, management system and achievements can be effective in gaining stakeholder trust. The following are some typical examples for SMEs in the logistics industry:

[When Adrian Dalsey, Larry Hillblom and Robert Lynn founded DHL in 1969, they didn't know they would revolutionize the world of logistics. Today, DHL is the world's leading logistics company. Our 400,000 people in over 220 countries and territories work every day to help you cross borders, reach new markets and grow your business. Or simply send a letter to your loved ones.]

Reference: <https://www.dhl.com/global-en/home/about-us.html>

[Kerry Logistics is the master brand of Kerry Logistics Network Limited.

Kerry Logistics Network Limited and its group of companies ("Kerry Logistics Network" or the "Group") is an Asia-based, global 3PL with a highly diversified business portfolio and the strongest coverage in Asia. We offer a broad range of supply chain solutions from integrated logistics, international freight forwarding (air, ocean, road, rail and multimodal), industrial project logistics, to cross-border e-commerce, last-mile fulfilment and infrastructure investment.

With a global presence across 60 countries and territories, Kerry Logistics Network has established a solid foothold in half of the world's emerging markets. Our diverse infrastructure, extensive coverage in international gateways and local expertise span across China, India, Southeast Asia, the CIS, Middle East, LATAM and other locations.

The Group generated a revenue of over HK\$53 billion in 2020 and is the largest international logistics company listed on the Hong Kong Stock Exchange (Stock Code 0636.HK) as well as a selected Member of the Hang Seng Corporate Sustainability Index Series 2020-2021.

Kerry Logistics Network has more than 40,000 full-time employees worldwide]

Reference: <https://www.kerrylogistics.com/en/about-us/>

[SF was established in Shunde, Guangdong Province in 1993. Since its inception, SF has continued improving its service quality, investing in facilities and vigorously developing and introducing IT technologies and equipment to realize automatic operations. Currently, we have set up a nationwide network of branch offices and service network to support information collection, market development, logistics and express services. For the past years, we have continued providing customers with fresh service experiences and helping customers succeed. February 24th 2017 witnessed the most important milestone in SF's development - SF was officially listed on Shenzhen Stock Exchange, starting a new journey.

SF International is SF Express' gateway to the global market. Especially for China market, SF international is not only helping Chinese enterprise to expand all over the world, but also bring quality products from overseas back to Chinese customers.]

Reference: https://www.sf-international.com/sg/en/about_us/

2. Use of Proceeds

In order to implement the sustainability strategy described in the previous section, it is necessary to describe the types of eligible green projects that the Company wishes to qualify for the use of the funds raised. The list of eligible green project categories is a core part of the first core component of the Green Bond Principle (GBP) and the Green Loan Principle (GLP). Eligible green projects should have clear environmental benefits that are evaluated by the company and, where feasible, quantified, measured and reported.

Typical examples of the types of eligible green projects related to the logistics sector as listed in GBP and GLP.

- Renewable energy (including production, transmission, appliances and products).
- Energy efficiency (e.g. new and renovated buildings, energy storage, district heating, smart grids, appliances and products).
- Pollution Prevention (including air emission reduction, greenhouse gas control, soil remediation, waste prevention, waste reduction, waste recycling, and energy/emission efficiency waste).
- Clean transportation (e.g., electric, hybrid, public, rail, non-motorized, intermodal, clean energy vehicle infrastructure, and hazardous emissions reduction).
- Green buildings that meet regionally, nationally or internationally recognized environmental performance standards or certifications.

The description of restrictions on the use of proceeds is also expected to be stated in the Green Finance Framework. Typical restrictions are that the funds raised may not be placed on the IFC's published exclusion list (Reference: https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/company-resources/ifcexclusionlist)



3. Process for Project Evaluation and Selection

After identifying the types of eligible green projects, the next step is to evaluate potential green projects against a set of selection criteria that will help the company apply the funds raised to the projects desired by the company and the investors/lenders. The purpose of this section of the Green Finance Framework is to provide investors/lenders with detailed information on the environmental sustainability objectives of eligible green projects, the process of evaluating and selecting potential green projects, and the process of identifying and managing the social and environmental risks expected to be associated with the evaluated green projects. Typical details on related topics can be found in the following table:

Topic	Typical Content	Remark
Responsibility	The evaluation of the technical and quality characteristics of the project can be provided by the supplier or contractor, and the SME operator can make the final approval.	Cross-functional groups (if applicable) are desirable, but not required.
Environmental efficiency KPIs (KPI)	Typical KPIs include annual electricity generation (kWh per year), annual electricity savings (kWh per year), reduction in air emissions (mg/kg km), fuel savings (liters per km), and green certification.	There is expected to be a clear link between the environmental benefits of qualifying green projects and the company's overall sustainability goals. Where possible, KPIs can be translated into an annual reduction in greenhouse gas emissions.

Environmental Risk	Conduct environmental impact assessments in accordance with applicable regulatory requirements or internal methodological requirements to identify and mitigate significant risks related to environmental aspects (pollution of air, soil and water, solid waste, noise and depletion of natural resources).	Significant risk may mean that the risk will lead to legal violations and objections in the public domain.
Social Risk	Conduct environmental impact assessments in accordance with applicable regulatory requirements or internal methodological requirements to identify and mitigate significant risks related to the welfare and well-being of the community (population displacement, unemployment, and occupational health and safety issues).	Significant risk may mean that the risk will lead to legal violations and objections in the public domain.
Investment Return	Where applicable, the project savings over time can be estimated and used to calculate the return on investment.	In addition to saving money, environmental benefits are also a key factor in determining returns.
Process	The self-assessment mechanism and selection criteria described in Chapter 1 can be used.	Selection rules may define a minimum self-assessment score for eligible green projects and/or all eligible projects are prioritized for selection based on the self-assessment score until funds are used.

4. Management of Proceeds

In order to allay investor/lender concerns about the actual use of the proceeds, particularly the placement of proceeds in non-qualified green projects that could affect the Company's ability to complete qualified green projects, it is necessary to explain how the utilization of the proceeds will be controlled and tracked. Temporary use of uncommitted proceeds is permitted, but the proceeds can be withdrawn if necessary, to ensure that progress on eligible green projects is not compromised. The types of investments that should be made available in the green finance framework for temporary use of proceeds.



5. Reporting

Regular updates on the use of funds raised are expected to be the minimum requirement, with typical reporting intervals being once a year. In addition to the return on investment, environmental benefits are the most expected return on green finance projects. The GBP and GLP describe the value of transparency in communicating the expected impacts of the project. For investors/lenders to understand the progress of eligible green projects and the achievement of Key Performance Indicators (KPIs), the description of project monitoring in the Green Finance Framework will provide more confidence to investors/lenders. Further guidance on project management and project monitoring is provided in the next chapter.

As carbon neutrality is at the top of the investor/lender agenda, the ability to report on the project's impact in terms of carbon emissions is another feature that may be welcomed by investors/lenders. Translating KPI results into carbon reductions is one thing, another challenge is to measure these results without spending too much resources and effort on data measurement, collection and calculation. Therefore, it is recommended that smart metering and automated systems be used to report impacts and carbon emissions, and that these costs can be included in the funding of eligible green projects.

C. Green Technology Application Notes

1. SPR Main Application

There are two main applications of an SPR container: i) refrigerated storage in remote or rural areas (Figure 5) and ii) cold chain logistics (Figure 6). One of the key issues involving refrigerated storage and transportation of agricultural goods is the perishable nature of the product. Many farms in remote conditions lack the ability to install refrigerated storages, as they must be connected to an electrical grid to function. The same goes for cold chain logistics, where the energy for refrigeration mainly comes from diesel, which is unsustainable.

For remote areas, SPR would provide the possibility of storage near the harvest site. This would reduce the necessity for immediate and rapid transportation of large quantities of crops to

far-off collection sites, reducing stress on the logistics parties. Most importantly, with reduced travel distances, spoilage of crops can be considerably reduced.



Figure 5: A visualization of a SPR container produced by Solar Freeze

For the SPR container vehicles, solar panels can be installed on the container to provide the energy necessary for the refrigeration. This can be done in two ways, either the vehicle is entirely powered by solar power, or it uses a solar-diesel hybrid system. For the latter, the diesel generator will turn on and off, supplementing the energy from the solar power. In either case, the usage of fossil fuels is greatly reduced, providing a cleaner and more renewable refrigeration method. Moreover, since this results in continuous energy generation, new technologies including vacuum panels, variable speed compressor refrigeration, PCM for energy storage and solar panels with AR coating would have to be installed on the container. This can not only reduce operation costs but also provide an off-grid, battery free refrigeration solution.



Figure 6: A visualization of a SPR container vehicle produced by Solar Freeze

2. Euro VI main applications

In Hong Kong, the incentive scheme has been announced, with an estimated recall of about 40,000 Euro IV vehicles by 2027.

From July 2017, the emission standards for all vehicles, except for diesel private cars, light buses and light motorcycles, will be tightened from Euro V to Euro VI. The increased requirements of the EU standards have required several countries to develop more effective technologies for diesel vehicle emission reduction.



Chapter 4. 《Green Project and Fundraising Management & Green Technology Operation and Maintenance》

A. Background

Green projects have the same characteristics and risks as other types of real-life projects, and every green project should be managed properly to ensure that it produces the desired results. In 2020, the International Organization for Standardization (ISO) published the international standard ISO 21502 to provide guidance on project management. Project management is described in the standard as "the coordinated activities that guide and control the achievement of consistent objectives" and further elaborates that "project management is necessary for the execution of a given project through a series of processes and methods that include systematic design and practice". The key themes to be discussed in this chapter will be the agreed objectives and the systems to achieve them.



B. Green Project Management and Fundraising Management

1. Key Performance Indicator (KPI)

First, project objectives and KPIs should be defined. In the direct capital market, investors/lenders place great importance on KPIs linked to environmental benefits, and expected returns are as important as repayment. When defining KPIs for eligible green projects, it is important to understand the company's overall sustainability objectives and the concept of environmental benefits. ICMA, the International Capital Markets Association, published a "Handbook - Harmonized Framework for Impact Reporting" in June 2021 for setting metrics for eligible green projects (reference): <https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Handbook-Harmonised-Framework-for-Impact-Reporting-June-2021-100621.pdf>. The Handbook can provide SMEs with useful guidelines and examples to determine

the appropriate KPIs for their projects. In addition, it is important to map the results of eligible green projects in relation to the UN-advocated Sustainable Development Goals (SDGs) (ref: <https://sdgs.un.org/goals>) to showcase projects that ICMA has published the "Green, Social and Sustainable Development" bond: High Level Mapping of SDGs June 2020, where SMEs can find useful tips for mapping their eligible green projects to SDGs. Typical examples are :

Qualified Green Projects	KPI	SDG
Solar panels generate renewable energy	<ul style="list-style-type: none"> Annual Renewable Energy Generation (MWh) Greenhouse gas emissions reduced/avoided per year (tonnes of CO2 equivalent) 	SDG7 Affordable Clean Energy
Replacement of Euro IV-engine vehicles with Euro VI-engine vehicles	<ul style="list-style-type: none"> Annual fuel saving energy (GJ) Greenhouse gas emissions reduced/avoided per year (tonnes of CO2 equivalent) 	SDG7 Affordable Clean Energy

2. Evaluation and selection of green technologies

Since eligible green projects involve green technology, SME staff who understand the technical details need to know information about the compliance, feasibility, benefits, reliability, timing and lifecycle, and operational requirements of the equipment involved in each project. The information is then evaluated by the SME owners and their staff responsible for finance, operations, and sales and marketing.

It is critical for SMEs to identify operational risks and determine whether they can be managed to a reasonable level in terms of legal and financial liabilities. SMEs need to be prepared to meet the challenges of investors/lenders regarding the reasons for choosing green technology. SMEs need to be aware of the possible options in the market and justify their decision that "business as usual" or compliance with legal and regulatory compliance may not be welcome.



3. Project planning and monitoring

To demonstrate an SME's ability to execute green projects, a well-thought-out project plan is required. Given the small size of eligible green projects for SMEs, a simple project plan with a list of tasks and control points, assignment of responsibilities and timeline is sufficient.

Project Name:	Solar panels generate renewable energy			
Project Reference Number:	GF_2021_SP			
Project Members:	Peter, Paul, Mary			
Jobs	Output	Responsible person	Start Date	Completion Date
Project Launch	Project plans, specifications, project monitoring report forms	Paul	2021.6.1	2021.6.7
Procurement of equipment and construction services	Quotations	Mary	2021.6.9	2021.7.14
Quotation evaluation (Control Point 1)	Equipment and Contractor Services	Peter, Paul, Mary	2021.8.1	2021.8.5
Project kick-off meeting with suppliers and contractors (Control Point 2)	Method statements and drawings, equipment lists, test plans and test acceptance criteria for functional testing, operation and reliability	Peter, Paul, Mary	2021.8.21	2021.8.23
Equipment Testing (Milestone 1)	Equipment Test Results	Peter, Paul, Mary	2021.10.15	2021.1.5
Installation Engineering	Installed solar panels, batteries and control equipment	Vendors and Contractors	2021.10.22	2022.1.30
Complete installation test (Milestone 2)	Installation test results	Paul	2021.11.15	2022.2.10
Equipment testing and installation supervision	Notes for reporting at project supervision meetings	Paul	2021.10.15	2022.2.10
Quarterly project monitoring meetings (Control Point 3)	Follow-up and improvement measures	Peter, Paul, Mary	2021.9.1	2022.2.15

An effective project monitoring mechanism will further gain investor/lender confidence and should ensure that the project is on the right track and that project tasks and milestones are completed as planned. If delays or quality issues arise, immediate remedial action will be required.



The following table provides details of a typical project monitoring report :

Project Monitoring Report					
Project Name:		Solar panels generate renewable energy		Project Reference Number:	GF_2021_SP
Responsible Person:		Paul		Commencement Date:	2021.6.1
Monitoring Distance:		Every two months		Project Completion Period:	2022.2.15
Monitoring Schedule	Executive	Satisfactory progress?	Output Satisfaction?	Questions, corrective measures and follow-up of results	
2021.8.1					
2021.10.5					
2021.12.3					
2022.1.3					

4. Fund Raising Management

Typical management is to keep the proceeds in a dedicated account and record all incoming and outgoing transactions in a register of proceeds. This requires a staff responsible for compilation and verification. An example of a book of proceeds is as follows :

Fund Raising Capital Register				
Green Finance Reference :		GF_2021		
Amount of registered capital raised :		HK\$10 million		
Qualified Green Projects 1 :		Solar Panel	Project Reference :	GF_2021_SP
Qualified Green Projects 2 :		Environmentally friendly engine vehicles	Project Reference :	GF_2021_VE
Date	In、 Out	Marker Reference	Trading Instructions	Amount
July 2, 2021	In	GF_2021_1	First drawdown of funds raised	3,000,000

July 2, 2021	Out	GF_2021_3	Fixed Deposit	1,000,000
July 5, 2021	Out	GF_2021_SP_1	Solar panel project design and construction phase I payment	500,000
July 10, 2021	Out	GF_2021_VE_1	Deposits for five Euro VI trucks	100,000

Producers:

Mary

Verifiers:

Paul



C. Green Technology Operation and Maintenance Manuals

The use of green technology is bound to have a series of operational needs and occasional damage situations, so a procedure or code of practice needs to be developed, including for dealing with unexpected events.

1. Operation and Maintenance of Solar Panel

In the industry, there are a lot of third-party companies which can provide O&M services, for example, to identify or avoid future issues such as clogging or getting fragile too soon from the corrosion spotted on the outsides of the enclosures, if any.

The scope for the O&M of solar panel can be divided into four categories/ ideas, this includes:

- Carrying out visual inspections
- Conducting verifications of the PV system operations
- Taking corrective actions
- Monitoring and verifying how effective the corrective actions are, etc..

2. General Check

With a proper O&M planning, the solar panel life can be maximized and extended. General checking is recommended to prevent maintenance at least twice a year by O&M personnel. A solar installation with a good maintenance can perform up to 30% better than one which is not. The general checking includes fine or course adjustment, lubrication, repairs and the extension of equipment life in any way. The enclosure on the electric parts, cleanliness of the components should be ensured. The general check can usually be performed by assigned worker with ease with visual inspections.

3. Specific Check

Apart from the basic checks, some specific checks are recommended by a well-trained competent person. The focus on the solar panel should always be on its modules, the cleaning frequency should be adjusted to the dusty level of the area. A good quality brush without hard bristle and well-trained technicians are required to develop such automated cleaning system. Post-wash is necessary to ensure no stains remain.

Apart from the focus on the modules, the inverter requires servicing as well on a quarterly basis. The voltage of the string inverter should be closely checked and monitored by a logbook to identify any voltage fluctuations if appear. Regular maintenance on the thermal-based components is also highly recommended.

4. Technical Data

The data interpretation and collection of data in real time are essential in order to maintain the efficiency of the solar panel. Any unusual fluctuation in power generated under constant supply of sunlight can help identify the defects before it becomes late.

5. Cost for Solar Panel Maintenance

From investigation, the average cost for maintaining a solar panel ranges around \$3,500 - which is the **cleaning** and **inspection** cost on a basic 2 kW solar PV system. Therefore, for a 5.7kW size solar panel on a container, it will cost around \$10,000 estimating by ratio. Apart from it, after inspection, the technician may suggest replacement or repair work if the components are damaged or not functioning properly.

Below is the table for the idea of repairing damaged components on a 5.7kW size solar panel on a container:

Problem	Average Cost
Broken glass	~\$3,000
Loose wiring	~\$2,100
Cracked panels	~\$3,000
Corrosion	~\$3,000

Problem

Broken inverter

Average Cost

~\$24,000

Here is a summary of the cost on replacement and repairing a 5.7kW size solar panel on a container:

Cost of replacement

\$10,000-\$100,000

Cost of repair

\$3,000-\$40,000

Luckily the solar panel usually last beyond their expected lifespan of 20 years, some new and advanced models even last up to 50 years. This will make the investment worth it in long term.

Apart from it, Photovoltaic (PV) solar panels typically come with a 20-year warranty, which ensures that the panels generate at least 80% of the rated power even after 20 years of. Besides, anti-freeze system is not necessary under normal weather in Hong Kong and therefore such cost can be neglected.

