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OCCUPATIONAL STRUCTURE

THE GREEN TECHNOLOGY INDUSTRY

OCCUPATIONAL STRUCTURE

Green Technology Industry

JABATAN PEMBANGUNAN KEMAHIRAN
KEMENTERIAN SUMBER MANUSIA

Department of Skills Development
Ministry of Human Resources, Malaysia

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1. EXECUTIVE SUMMARY

In order to complete the Occupational Analysis on the Green Technology Industry, all the information related to the Malaysian Green Technology Industry was gathered through literature survey and interviews with the experts from the public and private sectors. A workshop was held in an attempt to get a better understanding of the organisational structure, job titles, hierarchy objectives and primary activities of the job titles.

In Malaysia, the Green Technology Industry has a very strong potential to offer great opportunities in terms of employment as well as business regarding green technology based products. Besides that, with strong government and private support, this sector could expand more in the future.

During the development workshops, the panel members had identified four (4) main sectors that reflect the main category of Green Technology in Malaysia. The four (4) Green Technology sectors are such as Energy, Building, Water and Waste Management and Transportation.

The Green Technology Industry as well as other related industry will be developed further to transform them into a strategic enabler to support and contribute directly to the growth of the economy.

Efforts to conduct the Occupational Analysis in the Green Technology Industry followed by developing the relevant National Occupational Skills Standard documents and training manuals by the Department of Skills Development are timely.

2. CONCEPT AND STRUCTURE OF THE MALAYSIAN OCCUPATIONAL SKILLS QUALIFICATION FRAMEWORK (MOSQF)

The Malaysia Occupational Skills Qualification Framework (MOSQF) is a framework that will be a unified system to bind and interlink all the qualifications awarded in Malaysia. The MOSQF will serve as an instrument that develops and classifies qualifications based on a set of criteria that are approved nationally and is at par with international good practices at the level of learning attained by the learners. This includes learning outcomes achieved and thus clarifying levels of learning. The criteria will be used and accepted by all Department of Skills Development (DSD) accredited centres. The MOSQF is developed based on the Malaysian Qualifications Framework (MQF) and also based on frameworks used and referenced by other countries such as England, Wales and Northern Ireland, Australia, New Zealand and Europe. Therefore the MOSQF will enable it to become a translation device to make qualifications more readable and understandable across different countries. The framework was developed in order to improve the current national training system for all parties of interest such as individuals, skills training providers, the Government, associations, professional bodies, the sector and the Malaysian community. The MOSQF has defined eight (8) levels of qualifications in four sectors of education. The four (4) sectors of education are the:

- Skills sector;
- Vocational and technical sector;
- Life-long learning sector; and
- Higher education (university) sector.

The eight (8) levels of qualifications can be seen in *Figure 2.1: MOSQF – Four (4) Higher Education Sectors and Eight (8) Qualifications Levels.*

<table>
<tr><th rowspan="2">QUALIFICATION / LEVELS</th><th colspan="3">SECTORS</th><th rowspan="2">LIFELONG LEARNING</th></tr>
<tr><th>SKILLS</th><th>VOCATIONAL AND TRAINING</th><th>HIGHER EDUCATION</th></tr>
<tr><td>8</td><td>Malaysian Skills Higher Meister</td><td></td><td>Doctoral Degree</td><td rowspan="10">Accreditation for Prior Experiential Learning (APEL)</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Malaysian Skills Meister</td><td rowspan="2"></td><td>Master's Degree</td></tr>
<tr><td>Postgraduate Certificate and Diploma</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Malaysian Skills Higher Advanced Diploma</td><td rowspan="2"></td><td>Bachelor's Degree</td></tr>
<tr><td>Graduate Certificate and Diploma</td></tr>
<tr><td>5</td><td>Malaysian Skills Advanced Diploma</td><td>Advanced Diploma</td><td>Advanced Diploma</td></tr>
<tr><td>4</td><td>Malaysian Skills Diploma</td><td>Diploma</td><td>Diploma</td></tr>
<tr><td>3</td><td>Malaysian Skills Certificate 3</td><td rowspan="3">Vocational and Technical Certificate</td><td>Certificate</td></tr>
<tr><td>2</td><td>Malaysian Skills Certificate 2</td><td></td></tr>
<tr><td>1</td><td>Malaysian Skills Certificate 1</td><td></td></tr>
</table>

Source: *MOSQ Division, Department of Skills Development*
Date Reviewed: *June 2008*

Figure 2.1: *MOSQF – Four (4) Higher Education Sectors and Eight (8) Qualifications Level*

MALAYSIA OCCUPATIONAL SKILLS QUALIFICATION FRAMEWORK (MOSQF)

LEVEL	LEVEL DESCRIPTION
1	Achievement at this level reflects the ability to use relevant knowledge, skills and procedures to **complete routine and predictable tasks** that include responsibility for completing tasks and procedures subject to **direction or guidance**
2	Achievement at this level reflects the ability to select and use relevant knowledge, **ideas**, skills and procedures to **complete well-defined tasks and address straightforward problem.** It includes **taking responsibility** for completing tasks and procedures, **and exercising autonomy** and **judgment** subject to overall direction or guidance
3	Achievement at this level reflects the ability to **identify and use relevant understanding,** methods and skills to **complete task** and address problems that are well defined with a **measure of complexity.** It includes taking responsibility for initiating and completing tasks and procedures as well as exercising autonomy and judgments **within limited parameter.** It also reflects awareness of different perspectives or approaches within an area of study or work
4	Achievement at this level reflects the ability to identify and use relevant understanding, methods and skills to address problems that are well defined but **complex and non-routine.** It includes taking responsibility for overall courses of action as well as exercising autonomy and **judgment within fairly broad** parameters. It also reflects **understanding of different** perspective or approaches within an area of study or work
5	Achievement at this level reflects the ability to identify and use relevant understanding, methods and skills to address **broadly-defined, complex problems.** It includes taking responsibility for **planning and developing courses** of action as well as exercising autonomy and judgment within broad parameters. It also reflects **understanding of different perspectives, approaches or schools of thought and the reasoning behind them**

LEVEL	LEVEL DESCRIPTION
6	Achievement at this level reflects the ability to refine and use relevant understanding, methods and skills to address **complex problems that have limited definition.** It includes taking responsibility for planning and developing courses of action **that are able to underpin substantial change** or development, **as well as exercising broad autonomy and judgment.** It also reflects an understanding of different perspectives, **approaches of schools of thought and the theories that underpin them**
7	Achievement at this level reflects the ability to **reformulate** and use relevant understanding, methodologies and approaches to address **problematic situations** that involve many interacting factors. It includes taking responsibility for **planning and developing** courses of action that initiate or underpin substantial change or development, as well as exercising broad autonomy and judgment. It also reflects an understanding **of theoretical and relevant methodological perspectives, and how they affect their area of study or work**
8	Achievement at this level reflects the **ability to develop original understanding** and extend an area of knowledge or professional practice. It reflects the ability to address problematic situations that involve many complexes, interacting factors through initiating, designing and undertaking research, development or strategic activities. It involves the exercise of broad autonomy, judgement and leadership in sharing responsibility for the development of a field of work or knowledge, or for creating substantial professional or organisational change. It also reflects a critical understanding of relevant theoretical and methodological perspectives and how they affect the field of knowledge or work.

Source: *MOSQ Division, Department of Skills Development*

Date Reviewed: *2 April 2008*

Figure 2.2: *Malaysia Occupational Skills Qualification Framework (MOSQF) Levels Description*

3. GREEN TECHNOLOGY INDUSTRY IN MALAYSIA – BACKGROUND OF THE INDUSTRY

3.1 Preamble

As a rapidly developing nation, Malaysia is not excluded from the challenges. Malaysia, too has initiated strategies to minimise the negative environmental impacts in the energy supply chain. In 1979, the National Energy Policy was formulated to ensure adequacy, security and cost-effectiveness of energy supply, as well as to promote the efficient utilisation of energy. This was further emphasised in the Ninth Malaysia Plan where efforts in the utilization of renewable energy (RE) resources and efficient use of energy were further promoted.

The establishment of the Ministry of Energy, Green Technology and Water reflects Malaysia's seriousness in driving the message that 'clean and green' is the way forward towards creating an economy that is based on sustainable solutions.

The Malaysian Government has developed national development plans such as the Tenth Malaysian Plan and the Third Industrial Master Plan that are targeted at positioning Malaysia's long-term competitiveness to meet the challenges of a fast changing global economic environment. Among the thrusts of these development plans are to sustain the Green Technology Industry as a major source of growth.

The supply of a competent workforce with the requisite skills in key sectors of Malaysia's economy, particularly in Green Technology will be increased in line with sector demand. In addition, the intake into local skills training institutes and institutions of higher learning as well as the offering of emphasised courses will be expanded. Public-private sector collaboration for example the knowledge workers skills development

program will also be promoted in specific areas. University and sector collaboration and linkage will be enhanced to improve curriculum design to produce graduates with the relevant knowledge and skills required by the sector.

This Occupational Analysis has been developed in accordance to the needs of the industry and government policies. The result of the analysis is an occupational framework covering the four main sectors where Green Technology is applicable in Malaysia and also are focus of the National Green Technology Policy which are: energy, buildings, water and waste management and transportation.

It must be noted that Nuclear Energy has not been included in this framework due to the following reasons. Although nuclear energy has been marketed as an environmentally sound, renewable source of energy in recent years it is not renewable as it is reliant upon a finite source of fuel that can be exhausted. The uranium (or plutonium) used in nuclear power is a natural resource in the same way that oil, coal and natural gas are.

However, we cannot dismiss it all together as it is free of green house gas emissions and does not affect global warming. As Malaysia has ventured in the research of nuclear energy, therefore it is recommended that there should be a different Occupational Analysis done to determine the sectors and job titles available in this sector.

3.2 Definition of Green Technology

Technology has always played a key role – form innovations in medicine to the clothes we wear, form smart gadgetry to our understanding of the intricate patterns that make this planet function and even that which exists beyond our realm.

Green technology encompasses sustainability, viability and waste reduction in the fields of energy, green building, green design, green purchasing, green chemistry, green nanotechnology and lots more.

In the case of green technology, we have energy-efficient homes, solar-powered cars and wind farms showcasing the power of technology to transform our world with dazzling creations and innovations for a sustainable future. Where water pollution and scarcity are increasing threats to our survival, where rising levels of air pollution are damaging our health, where land degradation and habitat destruction are undermining ecosystem services that ensure our survival, green technology brings a sense of hope that things could be not quite so fatal.

Green technology demonstrates that there are better, cleaner and more efficient methods and devices. For example solar power and wind energy are a thousand times less risky and less harmful on ecological resources.

Innovation in the way of green technology has brought spectacular ideas to life keeping in mind a future devoid of waste and destruction. Bio-mimicry, sustainable technologies inspired by nature, for an instance, is being used to design wind turbine blades that function like humpback whale fins which are surprisingly agile in water.

This new design promises greater efficiency in wind turbines, hydroelectric turbines and irrigation and ventilation pumps. Solar powered skyscrapers are also being designed to mimic the movable dynamic architecture of a tree.

Green Technology is the development and application of products, equipment and systems used to conserve the natural environment and

resources, which minimise and reduces the negative impact of human activities.

Green Technology refers to products, equipment or systems which satisfy the following criteria:

- It minimises the degradation of the environment;
- It has zero or low green house gas (GHG) emission;
- It is safe for use and promotes healthy and improved environment for all forms of life;
- It conserves the use of energy and natural resources; and
- It promotes the use of renewable resources.

Technology is an invention or tools that would improve the lives of human kind. The term 'technology' has a Greek origin of "technologia". The inventions, developments and uses of technology have progressed tremendously over the last century, starting from the industrial revolution in the 18th century. However, the excessive exploitation of our natural resources through these technologies, have led to the production of unwanted byproducts such as waste and pollution.

Consequently, we are now facing bigger challenges in finding solutions to overcome the problem of depleting natural resources, climate change, energy supply and food security.

Today, the world is more cautious. Green Technology application is seen as one of the sensible solutions which are being adopted by many countries around the world to address the issues of energy and environment simultaneously. Green Technology is a technology that allows us to progress more rapidly but at the same time minimises the negative impact to the environment. However, the world needs to find more efficient and effective ways to adopt Green Technology against

other technologies which have been widely used and though cheaper, not necessarily kind to the environment.

3.3 Current Analysis of the Green Technology Industry in Malaysia

The Malaysian government has been embarking on a number of initiatives to change that in which green technology has been given a control role. For instance, strategies in promoting green technology in the country have been detailed out in the 10th Malaysia Plan and 2010 Budget. Similarly, the Ministry of Energy, Green Technology and Water (KeTTHA) has been advocating green technology by the formulation of the National Green Technology Policy, re-structuring of what is now called the Malaysia Green Technology Corporation / GreenTech Malaysia and the establishment of the National Green Technology Council chaired by the prime minister.

The government has been focusing on developing green technology in four major areas: energy, buildings, water and waste management and transportation. With that in mind, the National Green Technology Policy was launched last year and reflects the government's efforts in enhancing environmental sustainability. The policy focuses on fostering more Foreign Direct Investment (FDI) is green technology as well as promoting more Domestic Direct Investment (DDIs) and local industry participation.

Unser this policy, the Green Technology Council was established to implement a green technology roadmap and hopefully transform the country into the regional hub for green technologies.
Since then, the Malaysian Institute of Architects (PAM) and the Association for Consulting Engineers Malaysia (ACEM) have introduced the Green Building Index which promotes the adoption of energy saving and environmental sustainability concepts for buildings.

Similarly, the Ministry of Housing and Local Government are also reviewing the Uniform Building By-Laws to further promote the use of green technology.

To highlight the country's achievement, Putrajaya and Cyberjaya are being developed as pioneer townships to showcase the advances in green technology that are being made that can be emulated by other cities.

This year, the National Budget has identified green technology as an important sector in the country's economic development and included provisions to enhance development in this area in the form of incentives and tax deductions. To emphasise this, government procurements also give priority to products and services that comply with green technology standards.

Green purchasing is playing a larger and larger role not just in Malaysia but globally in countries or companies trying to reduce their carbon footprint on this planet.

Apart from that, the Malaysia government has also established a fund, the Green Technology Financing Scheme (GTFS), worth RM1.5 billion, for soft loans to encourage the use and supply of green technology. Under this scheme suppliers are entitled to a maximum financing of RM50 million while consumer companies, RM10 million.

The Ministries of Education and Higher Education are also working with KeTTHA in promoting and integrating green topics in the education system to create awareness among the young.

Nonetheless, green technology development in Malaysia is still in its infancy, thus making us reliant on developed countries for access to

cutting edge technology. This also means that green technology does not come cheap and in turn impedes its wider usage and applications.

That being said, green technology remains a crucial sector in transitioning to a sustainable and green economy. It will pave the way for a greener future promoting improved lifestyles, green jobs, cost savings and protect our fragile ecosystem from further degradation.

Malaysia's commitment is specifically underlined by its Green Technology Policy 2009 which aims to harness green technology development in the country. A Renewable Energy Policy and Action Plan (REAP) which sets the medium and long term strategy as well as targets for the policy is in the process of being introduced.

The focus of the REAP is particularly on renewable energy. The sources of renewable energy that have been identified under REAP include biomass, biogas, municipal solid waste, solar and mini-hydro. The Ministry of Energy, Green Technology and Water is also exploring the potential of using wind as a source of renewable energy in Malaysia.

The search for alternative energy in a country with a development boom like Malaysia is urgent as demand for energy rapidly grows. Renewable energy is a commodity just like any other form of energy. It has a major role in meeting energy demands and moving towards a low carbon future. The Malaysian National Energy Center estimates that Malaysia has an energy potential reaching over RM500 billion in 20 years. Renewable energy stands to be an important energy option with substantial benefits to corporations, consumers and the environment. While the REAP aims to provide a pathway to a low-carbon society, there are implementation challenges which needs further scrutiny.

Consistency and transparency in the way the policy is implemented is going to be a key question. In view of this, Datuk Dr. Halim Man, the secretary-general of the Ministry of Energy, Green Technology and Water has mentioned the need for legislation. He says that a Renewable Energy Act will 'pave the way for a new era for renewable energy development in the country'.

Legislation can potentially provide the rules to make renewable energy an important component in the country's energy mix. It can address market failures, create a level playing field for emerging technologies and phase out any unfair competition in the area.

In terms of the reach of the policy, it is also important to overcome technological barriers. There is a need to urgently step up research and development of viable renewable energy solutions that are appropriate for a country like Malaysia. For example, according to Dr. Halim Man, his ministry estimates that solar energy will surpass all other forms of renewable energies for Malaysia after 2020.

The potential to develop a Malaysia-specific renewable energy mix will also be highly dependent on the need to drive down cost by providing direct and indirect subsidies. The REAP needs to be specific about the potential incentives that the government can offer.

The policy also outlines some industries that can potentially benefit from the government's commitment particularly through development of new markets and cost savings:

a) Energy supply sector

Green technology is particularly useful in power generation and in energy supply management areas. Potentials can include

more co-generation by the industrial and commercial sectors which can lead to cost efficiencies.

b) Energy utilisation sector

Application of green technology in all areas and in demand side management programmes.

c) Building sector

Particularly in the construction, management, maintenance and demolition of buildings can provide new avenues for a greener construction industry.

d) Waste and water management sector

Potential for technology demand in the management and utilisation of water resources, waste water treatment, solid waste and sanitary landfill.

e) Transportation sector

Ability to incorporate green technology in transportation infrastructure and vehicles, particularly through development of biofuels and public road transport.

Finding a path to sustainable energy will require concerted effort from the government and industry. The Malaysian government is moving in the right direction towards this end. While there are implementation issues with the policy which need further scrutiny, an umbrella framework like this is just the catalyst to drive change. Yet, for true

eco-innovation to thrive, Malaysian industry must embrace the energy challenge and tap on the opportunities presented by the policy.

The Green Technology Industry, which would be one of the country's new growth engines, would be the Malaysian government's economic focus, as advocated by Malaysian Prime Minister Najib Razak.

Emerging economies, including Malaysia's, have a major opportunity to attract potential investors, technology transfers and to create conducive platforms for industry cooperation.

Ambassador and head of Delegation of the European Union (EU) to Malaysia, Vincent Piket, said the regulation encouraging consumer demand for sustainable goods and services, protection for intellectual property rights and market stability were effective to attract investment in green technologies and to reduce greenhouse gas emissions in the European context.

3.4 Policies, Governing Bodies and Development Plan for the Green Technology Industry

i) Green Technology and the Tenth Malaysia Plan

The Tenth Malaysia Plan spanning from 2011 to 2015 will focus on 12 National Key Economic Areas or NKEAs which have potential to generate high income. For economic sectors not listed as NKEAs, such as green technology, automotive, aerospace and logistics, the development of these sectors will continue to be driven by relevant ministries, agencies and councils. Therefore, under the national goals namely the Tenth Malaysia Plan, there are short term goals that are hoped to be

achieved within the duration of the Tenth Malaysia Plan such as below:

- Increased public awareness and commitment for the adoption and application of Green Technology through advocacy programmes;

- Widespread availability and recognition of Green Technology in terms of products, appliances, equipment and systems in the local market through standards, rating and labelling programmes;

- Increased foreign and domestic direct investments (FDIs and DDIs) in Green Technology manufacturing and services sectors; and

- Expansion of local research institutes and institutions of higher learning to expand Research, Development and Innovation activities on Green Technology towards commercialisation through appropriate mechanisms.

ii) The National Green Technology Policy

The national goals of the Green Technology Policy is to provide direction and motivation for Malaysians to continuously enjoy good quality living and a healthy environment. According to the policy, Green Technology shall be a driver to accelerate the national economy and promote sustainable development. Below are the Four Pillars of the National Green Technology Policy:

a) Energy

Seek to attain energy independence and promote efficient utilisation;

b) Environment

Conserve and minimise the impact on the environment;

c) Economy

Enhance the national economic development through the use of technology; and

d) Social

Improve the quality of life for all.

The National Green Technology Policy embodies elements of economic, environment and social policies, as reflected in the five (5) objectives as follows:

- To minimise growth of energy consumption while enhancing economic development;
- To facilitate the growth of the Green Technology Industry and enhance its contribution to the national economy;
- To increase national capability and capacity for innovation in Green Technology development and enhance Malaysia's competitiveness in Green Technology in the global arena;
- To ensure sustainable development and conserve the environment for future generations; and
- To enhance public education and awareness on Green Technology and encourage its widespread use.

The following four (4) key areas to have significant progress have been identified under the national policy:

a) Energy Sector

- Energy Supply Sector
  Application of Green Technology in power generation and in the energy supply side management, including co-generation by the industrial and commercial sectors; and

- Energy Utilisation Sector:
  Application of Green Technology in all energy utilisation sectors and in demand side management programmes.

b) Buildings Sector
Adoption of Green Technology in the construction, management, maintenance and demolition of buildings.

c) Water and Waste Management Sector
Technology in the management and utilisation of water resources, waste water treatment, solid waste and sanitary landfill.

d) Transportation Sector
Incorporation of Green Technology in the transportation infrastructure and vehicles, in particular, biofuels and public road transport.

iii) The Green Technology Strategic Thrusts

Strategic Thrust 1
Strengthen the institutional frameworks

In nurturing the adoption and growth of Green Technology, it is critical to have strong institutional arrangements to promote Green Technology applications through:

- Formation of a Green Technology Council chaired by Y.A.B Prime Minister or Y.A.B. Deputy Prime Minister for high-level coordination among Government Ministries, agencies, the private sector and key stakeholders for effective implementation of the Green Technology Policy;
- Establishment of a Cabinet Committee on Green Technology chaired by Y.A.B Prime Minister or Deputy Prime Minister;
- Establishment of the Malaysia Green Technology Agency for the effective coordination and implementation of Green Technology initiatives and programmes;
- Review and establish legal mechanisms to foster an accelerated growth of Green Technologies in line with National Objectives and Goals; and
- Enhancement of institutional clarity so that all agencies are aware of their respective roles and responsibilities.

Strategic Thrust 2
Provide Conducive Environment for Green Technology Development

The growth of the Green Technology Industry, either in manufacturing or service sectors, is critical towards fulfilling the objectives of the Green

Technology Policy. This industry would supply the Green Technology to the local and global markets, create jobs and contribute towards the national economy. This could be achieved through:

- Introduction and implementation of innovative economic instruments, supported by the necessary monetary and fiscal measures to foster an accelerated growth of Green Technology in line with the National objectives and goals;
- Strengthening the understanding of local players in Green Technology industries and their value chain, including the supporting industries through various industries' enhancement programmes;
- Promotion of foreign direct investments (FDIs) on Green Technology which foster domestic direct investment (DDIs) and local industry participation and development;
- Establishment of strategic Green Technology hubs throughout Malaysia, expanding from the core value chain to the upstream and downstream of the industry; and
- Establishment of Green Technology funding mechanism.

Strategic Thrust 3
Intensify Human Capital Development in Green Technology

Skilled, qualified, competent and productive human resources are crucial to Green Technology development. This could be achieved through:

- Design and enhancement of training and education programmes to improve human resource capacity related to Green Technology;

- Provision of financial and fiscal incentives for students to pursue Green Technology disciplines at undergraduate and postgraduate levels;
- Implementation of retraining programme and apprenticeship scheme to enhance competency of semi-skilled labour to meet the demands of the Green Technology Industry;
- Formulation of grading and certification mechanism for competent personnel in Green Technology; and
- Exploitation of brain gain programmes to strengthen local expertise in Green Technology.

Strategic Thrust 4
Intensify Green Technology Research and Innovations

Research, Development, Innovation and Commercialization (RDIC) is very crucial in creating new technologies, techniques and applications which would be able to reduce the cost of Green Technology and promote its usage. Research, Development and Innovations (RDI) could be enhanced through:

- Provision of financial grants or assistance to public and private sector in RDIC;
- Implementation of Green Technology foresight;
- Establishment of an effective coordinating agency for RDI and Centre of Excellence or new research institute for Green Technology development;
- Enhancement of smart partnerships between the Government, industries and research institutions; and
- Establishment of strong linkages between local research institutions and regional and international centres of excellence in Green Technology RDI.

Strategic Thrust 5
Promotion and Public Awareness

Effective promotion and public awareness are two of the main factors that would affect the success of Green Technology development. This is particularly significant as such adoption requires the change of mindset of the public through various approaches including:

- Effective, continuous promotion, education and information dissemination through comprehensive roll-out programmes to increase public awareness on Green Technology;
- Effective involvement of media, non-governmental organizations and individual stakeholders in promoting Green Technology;
- Inculcation of a culture that appreciates Green Technology among students at all levels through the development of effective syllabus in the education systems;
- Demonstration programmes of effective Green Technology applications; and
- Adoption of Green Technology in all Government facilities and Government-linked entities.

iv) Ministry of Energy, Green Technology and Water

The Ministry of Energy, Water and Communications (MEWC) was established on March 27, 2004 following Malaysia's new cabinet line-up, hence replacing the Ministry of Energy, Communications and Multimedia. The Ministry's role is to administer and manage the nation's energy, communications (infrastructure), postal services and water functions.

The role of the Ministry has shifted from being a service provider to a policy formulator and service regulator for the Energy, Water and Communications sectors. The Ministry's main thrust is therefore to facilitate and regulate the growth of industries in these sectors to ensure the availability of high quality, efficient and safe services at a reasonable price to consumers throughout the country. The regulatory function of the Ministry is undertaken through its regulatory bodies, namely, the Energy Commission and the Communications and Multimedia Commission.

The following are the ministry's objectives:

- To minimise growth of energy consumption while enhancing economic development;
- To facilitate the growth of the Green Technology Industry and enhance its contribution to the national economy;
- To increase national capability and capacity for innovation in Green Technology development and enhance Malaysia's competitiveness in Green Technology in the global arena;
- To ensure sustainable development and conserve the environment for future generations; and
- To enhance public education and awareness on Green Technology and encourage its widespread use.

v) Malaysian Green Technology Corporation (Formerly known as the Malaysian Energy Centre)

The Malaysian Green Technology Corporation was registered on 12th May 1998 as a not-for-profit company. The rationale behind MEC's establishment is to fulfill the need for a national

energy research centre that will co-ordinate various activities, specifically energy planning and research, energy efficiency, and technological research, development and demonstration (R,D&D) undertaken in the energy sector due to the long lead time for energy projects to come on stream.

In fact, MEC will eventually become a one-stop focal point for linkages with the universities, research institutions, industries and other various national and the Low Energy Office is a building with a significantly lower Building Energy Index performance which was conceived even before the question of promoting sustainable buildings was widely adopted. The cost premium for the LEO building was only 10% to achieve electricity use reduction of over 50%, giving a simple payback period of only about 8 years at the pre-2006 electricity tariffs. At today's electricity tariffs the payback period would be only about 5 years. Moreover, the cost premium for the energy efficient (EE) technologies employed for the LEO building have also declined and some have become the standard norm.

The MEC's Building Energy Index (BEI) of 65 Kilowatt hour per square-meter per year (kWh/m2/year) is the lowest for any comparable office building in Malaysia. Additionally, the Photovoltaic's systems which are incorporated as the building material and architecture generate about 50% of its total electricity consumption, giving it an even lower net BEI of 30 kWh/m2/year. The MEC building's performance shows to what extent efficient use of electricity, coupled with local electricity generation from solar photo-voltaic systems, can be exploited to minimise energy use in air-conditioned office buildings. This building project had been developed as an experimental project using "cutting edge Energy Efficient technologies" to achieve

its low net building energy index. These EE technologies were not fully "cost-effective" at the time of design, but will be so in a few years as the EE technologies' cost premiums decline and electricity prices escalate. I am also told that some of these technologies are produced locally and that their cost premium has also declined from the days when they were incorporated into the MEC building. This is a welcome development indeed and clearly shows the wisdom of "going Green" in the construction of this building.

vi) Budget 2010

To further promote the development of green technology activities, the Government will:

- First

  Restructure the Malaysia Energy Centre as the National Green Technology Centre tasked with formulating a green technology development action plan. This Centre will function as the focal point to set standards and promote green technology. To intensify green awareness activities and practise environment-friendly lifestyle, an allocation of RM20 million will be provided;

- Second

  Organise an international exhibition on green technology in 2010. The exhibition is expected to attract internationally renowned companies and experts in green technology;

- Third

  Develop Putrajaya and Cyberjaya as pioneer townships in Green Technology, as a showcase for the development of other townships; and

- Fourth

  Give priority to environment-friendly products and services that comply with green technology standards in Government procurement.

vii) Green Technology Financing Scheme

In the budget speech for 2010, Dato' Seri Najib Tun Abdul Razak, the Prime Minister of Malaysia announced the establishment of the Green Technology Financing Scheme amounting to RM1.5 billion as an effort to improve the supply and utilisation of Green Technology. The scheme could benefit companies who are producers and users of green technology.

3.5 Skilled Worker Requirement in The Local Sector

Green Technology deployed judiciously will deliver the double impact of accelerating our economic growth while addressing pressing environmental issues. Green Technology will in fact have broad applications across different sectors such as in energy production, manufacturing, services and transport, to name a few. In addition, investing in a 'green economy' will increase the number of 'green collar' jobs to the labour force which in turn will further contribute to the strengthening of the economy.

At the same time, we must ensure that we have skilled, qualified, competent and productive human resources as this is a crucial factor for Green Technology development. Hence, Strategic Thrust 3 will seek to intensify human capital development by availing training and education programmes and by providing financial packages and incentives for students embarking on green technology related subjects. The Ministry of Energy, Green Technology and Water and the Ministry of Higher Education together with the Ministry of Human Resources will make available a system for a formulation of grading and certification mechanisms for competent personnel in Green Technology. This would help build our skilled and semi-skilled human capacity for green technology industries to prosper in the country. Efforts are being taken to create a sufficient pool of skilled workers, particularly in the field of green technology.

According to Y.B Datuk Dr. S. Subramaniam, Green Technology was among the new skills training courses being developed by his ministry that was aimed at turning Malaysia into a high income economy by 2015. “Green Technology is an area that is being looked at as it is an area where there is great scope for job creation and development of new skills,” Subramaniam said that Green Technology covered several sectors such as renewable energy, of which Malaysia had an advantage, as it is one of the world’s largest producers of solar panels.

“Some countries such as South Korea and Taiwan have moved forward in Green Technology and we are following suit”. In addition, he said, the new skills training programmes would also look at producing more skilled workers for the outsourcing industry, where Malaysia ranks third in the world.

He said that now ministry officials were talking to key industry players in the public and private sectors about development of new skills training programmes.

“Our curriculum is currently under review and those that are in existence will be standardised with international standards,” he said.

He added that specific skills training courses would be carried out as joint certification programmes with international institutions.

He said the Government had set aside RM1 bil fund to provide loans for school leavers and workers intending to undergo skills training programmes over the next five years.

At present, the ministry producers some 18,000 skilled workers via its skills training courses of some 100,000 others graduate from both public and private institutions.

The next 10 years will see a greater emphasis on human resource enhancement as availability of skilled and knowledge workers are a major pre-requisite to transform Malaysia from a production-based into a knowledge-based economy.

Malaysia offers investors a young, educated and productive workforce at costs competitive with other countries in Asia. Backed by the government’s continued support of human resource development in all sectors, the quality of Malaysia’s workforce is one of the best in the region. Literacy levels are high at more than 94% and school leavers entering the job market have at least 11 years of basic education.

In addition Malaysia registered a significant 4.2% productivity growth in 2007, ranking third after China and India. The growth which was the highest since 2001, has translated to a rise in the productivity of the Malaysian economic. Education and training are accorded high priority in national development under Malaysia’s five-year development plans.

To date, there are more than 17 public and 20 private universities and colleges, as well as various polytechnics and industrial training institutes that offer courses leading to certificate, diploma, degree and post-graduate degree qualifications. Total enrolment in public institutions of higher learning alone is projected to reach over 300,000 with more than half in the science and technical disciplines.

The Department of Skills Development (DSD) formerly known as the National Vocational Training Council under the Ministry of Human Resources coordinates the setting up of all public and private training institution, evaluates the demand for existing and future skills, identifies future vocational and industrial training needs and will continue to develop standards under the National Occupational Skills Standards (NOSS). To-date, there are more than 700 certified standards which covers certificate, diploma and advanced diploma qualifications.

Besides the increasing number of public training institutions such as technical schools, polytechnics, industrial training institutes and skills development centers to meet the growing requirements of the industrial sector, collaborative efforts between the Malaysian government, enterprises and foreign governments have resulted in the establishment of several advanced skills training institutes such as the German-Malaysian Institute, Malaysia France Institute, Japan Malaysia Technical Institute, British Malaysia Institute and Malaysian Spanish Institute.

3.6 Industrial Competition at International Level

Blessed with a diverse ecosystem and abundant natural resources, Malaysia has taken big steps in incorporating sustainability into its construction, energy, oil exploration, transportation, water resources and waste management operations. Malaysian expertise in green

technology is currently being deployed in power generation, lighting, landscaping and site planning, district cooling, desalination, solid waste disposal and management of indoor air quality across countries such as the UAE, India, Singapore, Qatar, Saudi Arabia and South Africa.

“The rising environmental concerns and the high level of attention given to renewable energy and energy-efficient architecture by countries like the UAE and Middle East present an expanding platform for co-operation and collaboration between Malaysia and West Asia,” said Dato Dzulkifli Mahmud, Senior Trade Commissioner Trade Consul of Malaysia in Dubai.

“Recent initiatives like the enforcement of green building principles in Dubai and the Masdar City in Abu Dhabi as well as the UAE capital being chosen to house the International Renewable Energy Agency (IRENA) are all set to make the UAE a regional and international sustainability hub. Green technology and consultancy is already a major service export from Malaysia and our bilateral trade with the UAE will gain new impetus in the present context,” added Dato Dzulkifli.

THE Malaysia External Trade Development Corporation (Matrade) recently participated at the Malaysia Services Exhibition (MSE) 2010 in Dubai, the United Arab Emirates. It showcased the world-class capabilities of Malaysian companies specialising in eight service clusters - Energy and Power Generation; Oil and Gas; Construction; Information and Communications Technology (ICT); Healthcare; Franchising; Education and Specialised Training, and Financial Services.

MSE 2010 identified potential projects worth RM12.8 billion for Malaysian service providers. The event, which was organised by MATRADE from April 13-15, received a total of 3,713 trade visitors and

a large number of trade inquiries. Malaysian exhibitors identified up to 174 potential projects and 289 foreign clients, partners and agents from various sectors such as green technology, construction, oil and gas, information and communications technology (ICT) and professional services. The projects identified include construction projects in Mecca, solar air conditioning systems in the UAE, property development in the UAE, distribution of ICT solutions in Gulf Cooperation Council (GCC) countries; biogas plants in Uzbekistan and the design of buildings in the UAE.

A signatory to the Kyoto Protocol, Malaysia reiterated its commitment to protecting the environment at the United Nations Climate Change Conference held in Copenhagen in December 2009 with a pledge to reduce its carbon footprint by 40% by 2020. The country is also aiming to be a major manufacturing hub for solar photo voltaic technology, a renewable energy source for residences and offices, which significantly cuts CO2 emissions and cost.

As a developing nation, Malaysia must stand ready to meet those challenges whenever they arise. In the energy sector, an important part of our readiness must include a clear understanding of our long-term energy needs while being aware of the increasing scarcity of supply from natural sources. No doubt, fossil fuels may still be our predominant source of energy for a few more decades but in times to come this may well change, as oil and gas are finite resources and eventually the world may literally run out of them.

Indeed, it is one of our biggest hopes to make Malaysia a regional hub for green technology particularly for renewable energy such as solar photovoltaic's (i.e. the use of solar cells for energy by converting solar power directly to electricity). Up to June 2009, Malaysia has attracted almost RM12 billion worth of investments from the solar photovoltaic's

industry through FDIs from top companies such as First Solar, Sun Power, Q-Cells and Tokuyama. The existence of these companies have and will continue to create a spill-over effect on to the local industry players thus encouraging greater domestic direct investments and expanding the pool of highly skilled and trained local workers in the country.

The Strategic Thrust 4, of the Green Technology Policy is to Intensify Green Technology Research and Innovation towards commercialisation. To facilitate research and innovations there is of course a need to provide financial grants or assistance to the public and private sectors. There is also a need to enhance smart partnerships as well as to establish effective coordination between agencies and Centres of Excellences in green technology. We need to also establish networks and collaborations with international leading research organisations and agencies to escalate development of new technologies and innovations on green technology between local and leading international researchers. In the long run this will increase our competitiveness in the international markets. To achieve all this incentives will be offered, the details of which will be announced in due course.

4. METHODOLOGY OF OCCUPATIONAL ANALYSIS – GREEN TECHNOLOGY INDUSTRY

In conducting the Occupational Analysis, a kick off meeting was held primarily to strategise the Plan of Action in accordance with guidelines as stated by the DSD in terms of scope of study, time frame and representation by a panel of Green Technology experts from both the public and private sectors as stipulated in the letter of offer. After the kick off meeting, a Plan of Action was formulated taking into consideration the activities and time frame required.

This chapter is divided into two (2) sections; the proposed methodology to construct the Occupational Definition for the respective Job Titles and the methodology of the overall Occupational Analysis Process.

4.1 Methodology to Construct Occupational Definition

This is a proposed methodology formulated by the facilitator, Dr. Amiron Ismail who is an experienced facilitator in NOSS, COS, LG and WIM development. This methodology is used in order to produce an Occupational Definition that is clear on the main job scope of the job title, the verb used is according to level of difficulty and the object is clearly described. Below are the main steps in producing the Occupational Definition for the respective job titles obtained in the Occupational Analysis:

(i) Determine the main sub sectors and areas in the sector;
(ii) Identify the job titles; and
(iii) Identify the job scope.

To describe the Occupational Definition clearly, the statement must consist of a ***Verb, Object*** and ***Qualifier***. The rationale of determining

the definition attributes are, to ensure consistency and continuity of using those attributes right from Occupational Analysis, Job Analysis to Task Analysis Developmental.

a) Object

Firstly, the object is determined before the other two (2) attributes. The object of any job is the main determinant of distinguishing one job to the other. For example, a demi-chef (kitchen sub-sector of Hotel Sector), deals with food and cooking utensils as the objects in performing tasks. While, a hairdresser deals with client's hair, hairdressing chemical, etc. The Objects are acquired from the expert panel members during a brainstorming session and written on DACUM cards so that all panel members can see the Objects identified. Objects of those in the related area or sub sector of the sector are determined as in the example below:

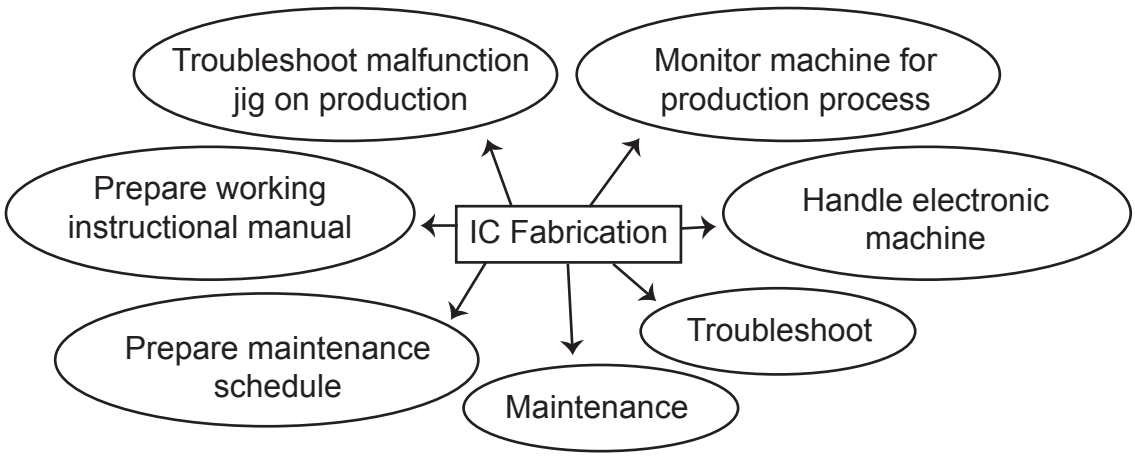
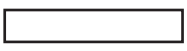


Figure 4.1: *Example of Identifying Objects*

Legend:

	Sector / Sub sector / Area / Sub area
	Object

b) Verb

The Verb is then determined based on the level of difficulty of the identified job titles, such as below:

√ ***Object :*** *maintenance schedule*
√ ***Verb for Level 6 : Prepare***
√ ***Verb for Level 7 : Analyse***
√ ***Verb for Level 8 : Evaluate***

Hence, the contents of the job definitions will be as below

√ **IC Fabrication Assistant Manager (Level 6)**
- Prepare maintenance schedule + (qualifier)

√ **IC Fabrication Manager (Level 7)**
- Analyse maintenance schedule + (qualifier)

√ **Microelectronic Specialist (Level 8)**
- Evaluate maintenance schedule + (qualifier)

c) Qualifier

Based on the example above, the statement is not clear as there is no qualifier for the object, therefore a qualifier must be added to further clarify it. Below is an example:

- Analyse maintenance schedule for the ***electronics productions equipment***

4.2 Methodology of the Overall Occupational Analysis Process

a) Literature survey

As outlined by the guidelines, a literature survey on the Green Technology Industry was carried out to get some insight on the scope, policy, program, activities in the context of the Malaysian scenario. The scope covered under this search includes definitions, current analysis of the sector/sub sector, current status of the Green Technology Industry, skilled workers requirement in the local sector and the industrial competition at international level.

b) Identifying sector & public sector experts

The literature survey findings were used as a guide to identify the scope of occupational study and analysis. Experts from the Green Technology Industry were identified and short listed for further communication and contact.

c) Establish contact with the Green Technology Industry experts

A pool of Green Technology experts from the sector and public sector were contacted. The lists of experts are included in Annex 1.

d) Information gathering

In the process of gathering the information, two (2) methods were adopted, namely; brainstorming and the Developing a Curriculum (DACUM) session. The brainstorming and DACUM session is attended by expert panels who discuss the different sub sectors and areas. The information gathered is then used as input to the occupational analysis of the said sector.

e) Analysing the information

Based on the activities done as above, substantial data and information were collected. The data and information were discussed and analysed in several in-house workshops attended by selected key person or experts from the public and sector. The presence of the key persons or experts was to help in the development of the Occupational Analysis for this sector.

During this session, attempts to reframe the Green Technology Industry in Malaysia were done using the following framework:

- Scope of the Green Technology Industry and its sub sector;
- Main area;
- Major occupational group of the sector;
- Job title;
- Hierarchy structure (Level 1 – 5); and
- Occupational definition.

f) Organise Workshop with expert panels

The first workshop has been conducted in the development of the Occupational Analysis of the Green Technology Industry. The details of the workshops are as below:

√ Held on the 21st and 22nd July, 2010 at Seri Malaysia Hotel, Melaka. The objectives of the workshop were:

- Presentation of preliminary findings
  - Δ Outline of Job Title
  - Δ Career structure
  - Δ Hierarchy structure (Level 1 – 5)
- Occupational Analysis Session
- Validation of the findings

√ Held on the 6th of October 2010 at the Shah Village Hotel, Petaling Jaya. The objectives of the workshops were:

- Validation of findings;
  - Δ Outline of Job Title
  - Δ Career structure
  - Δ Hierarchy structure (Level 1 – 5)
  - Δ Occupational Definition
- Occupational Analysis Session; and
- Verification and proofreading of the findings.

5. FINDINGS

The findings from the research of the Green Technology Industry's Occupational Analysis can be divided into two (2) categories, which are:

i) Newly Identified Sectors;
ii) Entry Level

5.1 Newly Identified Sectors

The newly identified sectors for the Green Technology Industry were obtained through literature research and discussions with sector experts during the development workshop sessions. According to The Tenth Malaysian Plan (RMK10), National Budget Plan and other related national economical plans, the nation is targeted to propel itself towards improving the quality of life of Malaysians and at boosting Malaysia's global competitiveness.

During the development workshops, the panel members had identified four (4) main sectors where Green Technology is applicable to be implemented in Malaysia. The four (4) Green Technology sectors are listed as below:-

(a) Energy
(b) Building
(c) Water and Waste Management;
(d) Transportation

The OA matrices for these four (4) sectors are included in this section. A total of 71 job titles exist in the proposed sub sectors. The Green Technology Industry expert panel members observe that the new framework offers a clearer framework and career pathway for the future workforce of the Green Technology Industry. Below are the descriptions of each of the different sectors:

(i) Energy

Energy is the key ingredient to any economic activity. Adequacy of energy supply is important for acceleration of economic development. Consumption of energy however produces some undesirable impacts on the environment and climate.

Hence, sustainable use of energy is being given increasing attention in Malaysia. Malaysia is well endowed with both conventional (non-renewable) and non-conventional (renewable) sources of energy. The largest non-renewable energy resource found in Malaysia is petroleum (i.e. oil and gas). This resource is being actively exploited. Although, Malaysia has some coal deposits, only a small percentage is being mined.

Renewable sources of energy are also abundant in Malaysia, the most important ones being biomass and solar. As in any developing nation, energy consumption per capita in Malaysia is still low but is expanding at a rapid rate in tandem with economic development. In addition, energy intensity with respect to gross domestic product had shown an increasing trend historically.

The 2 main sub sectors are Building Facilities and the Production of Renewable Energy. A total of 28 job titles are under the Energy sector. The Building Facilities area starts at Level 2, as an Assistant Technician until Level 5 as the Manager. The Solar Thermal, Solar Photovoltaic, Solar Hot water, Biomass, Hydro and Incineration areas start at Level 2, as an Assistant Installer until Level 5, Designer or Manager. The sub sectors are further divided into 7 areas which are:

a) Energy Audit

Energy audits are a systematic study or survey to identify how energy is being used in a building or a plant. It is also a useful procedure to find out the best options for energy conservation. Energy audits provide an analysis of the amount of energy consumed during a given period in the form of electricity, gas, fuel, oil or steam. Using that information, it is also possible to list how the energy was used according to the various processes in a plant or at the various outlets in a building. The next step in an energy audit then is to identify the potential for energy savings accurately.

Types of Energy Audit

- Preliminary Audit

The preliminary audit alternatively called a simple audit, screening audit or walk-through audit, is the simplest and quickest type of audit. It involves minimal interviews with site operating personnel, a brief review of facility utility bills and other operating data, and a walk-through of the facility to become familiar with the building operation and identify glaring areas of energy waste or inefficiency.

Typically, only major problem areas will be uncovered during this type of audit. Corrective measures are briefly described, and quick estimates of implementation cost, potential operating cost savings, and simple payback periods are provided. This level of detail, while not sufficient for reaching a final decision on implementing proposed measures, is adequate to prioritise energy

efficiency projects and determine the need for a more detailed audit.

- General Audit

  The general audit alternatively called a mini-audit; site energy audit or complete site energy audit expands on the preliminary audit described above by collecting more detailed information about facility operation and performing a more detailed evaluation of energy conservation measures identified. Utility bills are collected for a 12 to 36 month period to allow the auditor to evaluate the facility's energy/demand rate structures, and energy usage profiles. Additional metering of specific energy-consuming systems is often performed to supplement utility data. In-depth interviews with facility operating personnel are conducted to provide a better understanding of major energy consuming systems as well as insight into variations in daily and annual energy consumption and demand.

  This type of audit will be able to identify all energy conservation measures appropriate for the facility given its operating parameters. A detailed financial analysis is performed for each measure based on detailed implementation cost estimates; site-specific operating cost savings, and the customer's investment criteria. Sufficient detail is provided to justify project implementation.

b) Solar Thermal

Active solar cooling uses solar thermal collectors to provide thermal energy to drive thermally driven

chillers (usually adsorption or absorption chillers). The concentrating solar thermal collector, for example, provides solar thermal heat by concentrating the sun's energy on a collection tube and heating the recirculated heat transfer fluid within the system. The generated heat is then used in conjunction with absorption chillers to provide a renewable source of industrial cooling. The solar thermal energy system can be also used to produce hot water.

There are multiple alternatives to compressor-based chillers that can reduce energy consumption, with less noise and vibration. Solar thermal energy can be used to efficiently cool in the summer, and also heat domestic hot water and buildings in the winter. Single, double or triple iterative absorption cooling cycles are used in different solar-thermal-cooling system designs. The more cycles, the more efficient they are.

In the late 1800s, the most common phase change refrigerant material for absorption cooling was a solution of ammonia and water. Today, the combination of lithium and bromide is also in common use. One end of the system of expansion/condensation pipes is heated, and the other end gets cold enough to make ice. Originally, natural gas was used as a heat source in the late 1800s. Today, propane is used in recreational vehicle absorption chiller refrigerators. Innovative hot water solar thermal energy collectors can also be used as the modern "free energy" heat source.

c) Solar Photovoltaic

Photovoltaic cells depend on semiconductors such as silicon to directly convert solar energy to electricity. Because these types of cells are low-maintenance, they are best suited for remote applications.

The energy of the sun can be used in many ways. When plants grow, they store the energy of the sun. Then, when we burn those plants, the energy is released in the form of heat. This is an example of indirect use of solar energy.

The form we are interested in is directly converting the sun's rays into a usable energy source: electricity. This is accomplished through the use of "solar collectors," or, as they are more commonly known as, "solar panels." There are two ways in which solar power can be converted to energy. The first, known as "solar thermal applications," involve using the energy of the sun to directly heat air or a liquid. The second, known as "photoelectric applications," involve the use of photovoltaic cells to convert solar energy directly to electricity.

Solar power has an exciting future ahead of it. Because solar power utilizes the sun's light, a ubiquitous resource (a resource that is everywhere), solar panels can be attached to moving objects, such as automobiles, and can even be used to power those objects. Solar powered cars are being experimented with more and more frequently now.

Solar power is actually one of the cleanest methods of energy production known. Because solar panels simply convert the energy of the sun into energy mankind can use, there are no harmful byproducts or threats to the environment.

One major concern is the cost of solar power. Solar panels (accumulators) are not cheap; and because they are constructed from fragile materials (semiconductors, glass, etc.), they must constantly be maintained and often replaced.

Further, since each photovoltaic panel has only about 40% efficiency, single solar panels are not sufficient power producers. However, this problem has been offset by the gathering together of many large panels acting in accord to produce energy. Although this setup takes up much more space, it does generate much more power.

d) Solar Hotwater

Solar water heating (SWH) systems are a mature renewable energy technology which have been accepted in most countries for many years. SWH has been widely used in Israel, Australia, Japan, Austria and China.

In a “close-coupled” SWH system the storage tank is horizontally mounted immediately above the solar collectors on the roof. No pumping is required as the hot water naturally rises into the tank through thermo siphon flow. In a “pump-circulated” system the storage

tank is ground or floor mounted and is below the level of the collectors; a circulating pump moves water or heat transfer fluid between the tank and the collectors.

SWH systems are designed to deliver the optimum amount of hot water for most of the year. However, in winter there sometimes may not be sufficient solar heat gain to deliver sufficient hot water. In this case a gas or electric booster is normally used to heat the water.

Hot water heated by the sun is used in many ways. While perhaps best known in a residential setting to provide hot domestic water, solar hot water also has industrial applications, e.g. to generate electricity. Designs suitable for hot climates can be much simpler and cheaper, and can be considered an appropriate technology for these places. The global solar thermal market is dominated by China, Europe, Japan and India.

In order to heat water using solar energy, a collector, often fastened to a roof or a wall facing the sun, heats working fluid that is either pumped (active system) or driven by natural convection (passive system) through it. The collector could be made of a simple glass topped insulated box with a flat solar absorber made of sheet metal attached to copper pipes and painted black, or a set of metal tubes surrounded by an evacuated (near vacuum) glass cylinder. In industrial cases a parabolic mirror can concentrate sunlight on the tube. Heat is stored in a hot water storage tank. The volume of this tank needs to be larger with solar heating systems

in order to allow for bad weather, and because the optimum final temperature for the solar collector is lower than a typical immersion or combustion heater. The heat transfer fluid (HTF) for the absorber may be the hot water from the tank, but more commonly (at least in active systems) is a separate loop of fluid containing anti-freeze and a corrosion inhibitor which delivers heat to the tank through a heat exchanger (commonly a coil of copper tubing within the tank). Another lower-maintenance concept is the 'drain-back': no anti-freeze is required; instead all the piping is sloped to cause water to drain back to the tank. The tank is not pressurised and is open to atmospheric pressure. As soon as the pump shuts off, flow reverses and the pipes are empty before freezing could occur.

Residential solar thermal installations fall into two groups: passive (sometimes called "compact") and active (sometimes called "pumped") systems. Both typically include an auxiliary energy source (electric heating element or connection to a gas or fuel oil central heating system) that is activated when the water in the tank falls below a minimum temperature setting such as 55°C. Hence, hot water is always available. The combination of solar water heating and using the back-up heat from a wood stove chimney to heat water can enable a hot water system to work all year round in cooler climates, without the supplemental heat requirement of a solar water heating system being met with fossil fuels or electricity.

e) Biomass

Biomass is one of the oldest and most well-established energy sources in the world. Biomass is simply the conversion of stored energy in plants into energy that we can use. Thus, burning wood is a method of producing biomass energy.

If the burning of wood were the only biomass application, then that field of study would not be nearly as interesting as it is. In fact, biomass has many possibilities as a renewable energy source. High energy crops grown specifically to be used as fuel are being developed, and scientists are beginning to consider agricultural and animal waste products as possible fuel sources.

Biomass is energy produced from organic substances. The key to the power of biomass lies in the energy of the sun. All plants undergo a process called photosynthesis, whereby the plants use chlorophyll to convert the energy in the sun's rays into stored energy in the plants. Photosynthesis, water, and nutrients in the soil are the ingredients of plant growth.

There are several methods of converting biomass into energy. These methods include burning, alcohol fermentation, pyrolysis and anaerobic digestion.

- Burning

  Direct burning of biomass is the most straightforward method of energy production. Mankind has burned wood and other forms of biomass for thousands of years, to keep warm,

to cook food, and eventually to forge weapons and other tools.

The energy released by direct combustion takes the form of heat, and can be used to directly influence the temperature of a small environment or to power steam-driven turbines to produce electricity. Unfortunately, the burning of biomass is the cause of a great deal of pollution and has contributed to the so-called “greenhouse effect” and global warming.

A relatively new field of research is the development of high energy crops specifically designed to be burned for power generation. Because at most only about 5% of a plant’s mass is edible, the potential for large-scale biomass production is relatively great.

At the moment, however, growing large amounts of crops is still quite expensive. Thus, other methods of biomass energy production are being pursued with somewhat greater success. These methods include alcohol fermentation, anaerobic fermentation, and pyrolyis.

- Alcohol fermentation

  In alcohol fermentation, the starch in organic matter is converted to sugar by heating. This sugar is then fermented by yeast (as in the production of beer and wine). The resulting ethanol (also known as ethyl alcohol or grain

alcohol) is distilled and then blended with another fuel. “Gasohol,” the end product, has been used successfully in Brazil and the United States as an alternative to regular gasoline. The drawback to this method of biomass energy conversion is that the process itself requires the use of fossil fuels, and is therefore somewhat inefficient.

- Anaerobic digestion

  Anaerobic digestion converts biomass, especially waste products, into methane (a major component of natural gas) and carbon dioxide. The biomass is mixed with water and stored in an airtight tank. This form of biomass energy conversion is attractive because it converts human, animal, and agricultural waste into a gas that is readily used as an energy source. Although the process is quite costly, it is relatively efficient.

- Pyrolysis

  Pyrolyisis involves the heating of biomass in the absence of oxygen. Biomass such as wood or agricultural waste is heated to around 1000 degrees Fahrenheit and allowed to decompose into gas and charcoal (carbon). A major advantage of pyrolysis is that carbon dioxide, one of the main drawbacks to most biomass energy conversion processes, is not produced. A disadvantage, however, is that the biomass must be heated to relatively high temperatures, a process that in and of itself requires significant amounts of energy.

Below are the advantages and disadvantages of Biomass Technology:

Advantages

- Inexhaustible fuel source;
- No pollution;
- Often an excellent supplement to other renewable sources; and
- Versatile is used for powering items as diverse as solar cars and satellites.

Disadvantages

- Very diffuse source means low energy production--large numbers of solar panels (and thus large land areas) are required to produce useful amounts of heat or electricity
- Only areas of the world with lots of sunlight are suitable for solar power generation

f) Hydro

Hydroelectric systems make use of the energy in running water to create electricity. In coal and natural gas systems, a fossil fuel is burned to heat water. The steam pressure from the boiling water turns “propellers” called turbines. These turbines spin coils of wire between magnets to produce electricity. Hydro powered systems also make use of turbines to generate electrical power; however, they do so by using the energy in moving water to spin the turbines. Water has kinetic energy when it flows from higher elevations to lower elevations.

In larger scale hydroelectric plants, large volumes of water are contained by dams near the generator and turbines. The “fore bay” is a storage area for water that must be deep enough that the penstock is completely submerged. The water is allowed to flow into the electricity-generating system through a passage called the “penstock”. The controlled high-pressure water spins the turbines, allowing the generator to produce an electric current. The “powerhouse” contains and protects the equipment for generating electricity. The high-pressure water exits the system through a “draft tube.” The “fish ladder” (see “problems”) attempts to minimize the environmental impact of hydroelectric systems by providing a path for migrating fish to take.

As their name implies, micro-hydroelectric plants are the smallest type of hydroelectric energy systems. They generate between one kilowatt and one megawatt of power. The main application for these hydro systems is in small, isolated villages in developing countries. They are ideal for powering smaller services such as the operation of processing machines.

Small hydropower systems can supply up to 20 megawatts of energy. These systems are relatively inexpensive and reliable. They have the potential to provide electricity to rural areas in developing countries throughout the world. Small systems are especially important to countries that may not be able to afford the costs of importing fossil fuels such as petroleum from other countries.

In some areas of the world, the flow rate and elevation drops of the water are consistent enough that hydroelectric plants can be built directly in the river. The water passes through the plant without greatly changing the flow rate of the river. In many instances a dam is not required, and therefore the hydroelectric plant causes minimal environmental impact on its surroundings. However, one problem with run-of-the-river plants is the obstruction of fish and other aquatic animals. This and other problems are discussed in the next section.

Advantages

- Inexhaustible fuel source;
- Minimal environmental impact;
- Viable source - relatively useful levels of energy production; and
- Can be used throughout the world.

Disadvantages

- Smaller models depend on availability of fast flowing streams or rivers; and
- Run-of-the-River plants can impact the mobility of fish and other river life.

g) Incineration

Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials. Incineration and other high temperature waste treatment systems are described as “thermal treatment”. Incineration of waste materials converts the waste into ash, flue gas, and heat. The ash is mostly formed by the inorganic constituents of

the waste, and may take the form of solid lumps or particulates carried by the flue gas. The flue gases must be cleaned of gaseous and particulate pollutants before they are dispersed into the atmosphere. In some cases, the heat generated by incineration can be used to generate electric power.

Incineration with energy recovery is one of several waste-to-energy (WtE) technologies such as gasification, Plasma arc gasification, pyrolysis and anaerobic digestion. Incineration may also be implemented without energy and materials recovery.

In several countries, there are still concerns from experts and local communities about the environmental impact of incinerators. In some countries, incinerators built just a few decades ago often did not include a materials separation to remove hazardous, bulky or recyclable materials before combustion. These facilities tended to risk the health of the plant workers and the local environment due to inadequate levels of gas cleaning and combustion process control. Most of these facilities did not generate electricity.

Incinerators reduce the mass of the original waste by 80–85% and the volume (already compressed somewhat in garbage trucks) by 95-96%, depending on composition and degree of recovery of materials such as metals from the ash for recycling. This means that while incineration does not completely replace land filling, it significantly reduces the necessary volume for disposal. Garbage trucks often reduce

the volume of waste in a built-in compressor before delivery to the incinerator. Alternatively, at landfills, the volume of the uncompressed garbage can is reduced by approximately 70% by using a stationary steel compressor, albeit with a significant energy cost. In many countries, simpler waste compaction is a common practice for compaction at landfills.

Incineration has particularly strong benefits for the treatment of certain waste types in niche areas such as clinical wastes and certain hazardous wastes where pathogens and toxins can be destroyed by high temperatures. Examples include chemical multi-product plants with diverse toxic or very toxic wastewater streams, which cannot be routed to a conventional wastewater treatment plant.

Waste combustion is particularly popular in countries such as Japan where land is a scarce resource. Denmark and Sweden have been leaders in using the energy generated from incineration for more than a century, in localised combined heat and power facilities supporting district heating schemes. In 2005, waste incineration produced 4.8% of the electricity consumption and 13.7% of the total domestic heat consumption in Denmark. A number of other European countries rely heavily on incineration for handling municipal waste, in particular Luxembourg, the Netherlands, Germany and France.

ii) Building

Green Building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient through a building life-cycle. These processes are from sitting to design, construction, operation, maintenance, renovation and deconstruction. The purpose of this practice is concerning economy, utility, durability and comfort.

The main objective of green building is to reduce the overall impact of the built environment on human health and the natural environment. The reduction of that impact is through energy, water and other resources efficiency. It is also to protect occupant's health and improving employee productivity, reducing waste, pollution, and environmental degradation.

The main goal of green buildings are siting and structure design efficiency, energy efficiency, water efficiency and materials efficiency; indoor environmental quality enhancement, operations and maintenance optimisation and waste reduction.

There are a total of (nine) 9 job titles under the Building sector. The Construction area only exists at Level 5 as the Green Building Consultant. The entry level for the Green Building Consultant is at Level 5 because the personnel must be an engineer or a consultant.

The Maintenance and Demolition areas start at Level 2, Assistant Technician until Level 5, Manager.

a) Construction

Green building (also known as green construction or sustainable building) is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.

Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources;
- Protecting occupant health and improving employee productivity; and
- Reducing waste, pollution and environmental degradation.

A similar concept is natural building, which is usually on a smaller scale and tends to focus on the use of natural materials that are available locally. Other related topics include sustainable design and green architecture.

b) Maintenance

Green building measures cannot achieve their goals unless they work as intended. Building commissioning includes testing and adjusting the mechanical, electrical, and plumbing systems to ensure that all equipment meets design criteria. It also includes instructing the staff on the operation and maintenance. Those under this sub sector will be in charge of maintaining and understanding the operation of Green Buildings.

c) Demolition

Reuse and recycle construction and demolition materials can save materials. For example, using inert demolition materials as a base course for a parking lot keeps materials out of landfills and costs less. It require plans for managing materials through deconstruction, demolition and construction. However, the personnel under the Demolition sub sector must fulfill the requirements stipulated and obtain licensing from the relevant regulatory authorities namely under the Ministry of Internal Security.

iii) Water and waste management

There are a total of 12 job titles under the Water and Waste Management sector. The Solid Waste, Water and Waste Water area starts at Level 2 as an Assistant Technician until Level 5 as the Manager.

a) Solid waste

Municipal solid waste (MSW), also called urban solid waste, is a waste type that includes predominantly household waste (domestic waste) with sometimes the addition of commercial wastes collected by a municipality within a given area. They are in either solid or semisolid form and generally exclude industrial hazardous wastes. The term residual waste relates to waste left from household sources containing materials that have not been separated out or sent for reprocessing.

b) Water

Based on Malaysia's Development Plans, the Government is moving towards greater involvement in the management of water supply services and water resources, respectively in order to ensure efficient water supply services and sustainable water resources development. Therefore, there is a current need for the Water Operation Management personnel to ensure that the future water industry workforce has standardised work procedures.

Water is a capital intensive industry. Treating water as an economic good can balance supply and demand for water. The national water services industry is moving towards full cost recovery that relates to capital, maintenance and operation costs.

The demand of Water Operation Management expertise and skilled personnel has increased. This expertise will

enhance the performance and productivity of the Water Industry and also to overcome the shortage of skilled personnel in this profession.

c) Waste water

Industrial wastewater treatment covers the mechanisms and processes used to treat waters that have been contaminated in some way by anthropogenic industrial or commercial activities prior to its release into the environment or its re-use. Most industries produce some wet waste although recent trends in the developed world have been to minimise such production or recycle such waste within the production process. However, many industries remain dependent on processes that produce wastewaters.

The water industry is an integral part of ensuring Malaysia's utility service is uninterrupted and free from biological hazards. Water is the most basic necessity of any nation; therefore the need of skilled and competent personnel to ensure optimised and safe water sources is crucial.

The demand of Waste Water expertise and skilled personnel has increased. This expertise will enhance the performance and productivity of the Waste Water Services area and also to overcome the shortage of skilled personnel in this profession.

Domestic wastewater together with discharges from industry and agriculture has an impact on environmental

conditions in rivers and coastal waters. Discharges of waste water add to the general nutrient load contribute to eutrophication problems in rivers and coastal waters.

iv) Transportation

Transport or transportation is the movement of people and goods from one location to another. Modes of transport include air, rail, road, water, cable, pipeline and space.

There are a total of 20 job titles under the Transportation sub sector. The Infrastructure area starts at Level 4 as an Assistant Facilitator until Level 5 as the Facilitator. The Design area starts at Level 4 as an Assistant Designer until Level 5 as the Designer. The Maintenance area starts at Level 2 as an Assistant Mechanic until Level 5 as the Manager. The Fuel Research area starts at Level 4 as an Assistant Technologist until Level 5 as the Technologist and the Fuel Production area starts at Level 2 as Assistant Technician until Level 5 as Manager.

This sector deals with the incorporation of Green Technology in the transportation infrastructure and vehicles, in particular, fuels and public road transport. The areas are as defined by Malaysia's Green Technology Financing Scheme (GTFS) to be areas under the Green Technology Policy eligible to be funded for the transport sector.

a) Infrastructure

The term infrastructure has been used since 1927 to refer collectively to the roads, bridges, rail lines, and

similar public works that are required for an industrial economy, or a portion of it, to function. People now use infrastructure to refer to any substructure or underlying system. Under the definition of transport areas by the Green Technology Financing Scheme via the Malaysia Green Technology Corporation, transportation infrastructure is considered as one of the areas applicable to Green Technology.

b) Vehicle

Cars in the future will evolve to run cleaner and faster than ever before, because technologies are being continuously developed by automakers, engine manufacturers, and component suppliers. While more mainstream technologies like hybrid cars and hydrogen fuel cells continue to push the edges of today's car technology, all new innovations will be introduced in the future, which also contribute to better fuel economy, lower greenhouse gases and improved tailpipe emissions.

This sub sector has been divided into 3 areas which are Electric Car, Natural Gas Vehicle and Fuel Cell.

During the last few decades, increased concern over the environmental impact of the petroleum-based transportation infrastructure, along with the spectre of peak oil, has led to renewed interest in an electric transportation infrastructure. Electric vehicles differ from fossil fuel-powered vehicles in that the electricity they consume can be generated from a wide range

of sources, including fossil fuels, nuclear power, and renewable sources such as tidal power, solar power, and wind power or any combination of those. However it is generated, this energy is then transmitted to the vehicle through use of overhead lines, wireless energy transfer such as inductive charging, or a direct connection through an electrical cable. The electricity may then be stored onboard the vehicle using a battery, flywheel, or supercapacitors. Vehicles making use of engines working on the principle of combustion can usually only derive their energy from a single or a few sources, usually non-renewable fossil fuels. A key advantage of electric or hybrid electric vehicles is regenerative braking and suspension;[3] their ability to recover energy normally lost during braking as electricity to be restored to the on-board battery. A natural gas vehicle or NGV is an alternative fuel vehicle that uses compressed natural gas (CNG) or, less commonly, liquefied natural gas (LNG) as a clean alternative to other automobile fuels. A Fuel cell vehicle or FC vehicle (FCV) is a type of hydrogen vehicle which uses a fuel cell to produce its on-board motive power. Fuel cells create electricity to power an electric motor using hydrogen or a reformed hydrocarbon fuel and oxygen from the air.

c) Fuel

The fast depletion of fossil fuels, coupled with the increasing awareness of environmental issues, concern for increasing green house gas emissions and escalating petroleum prices, have led to concerted

efforts in the search for renewable and environmentally friendly alternative energy sources. Biofuel is one such fuel. In the global scene, especially on the European front, the use of methyl esters as diesel has achieved widespread acceptance. In fact, biodiesel made from rapeseed oil is already produced on a significant scale in Europe. The demand in the EU is projected to increase from 3 million tonnes in 2005 to 10 million tonnes in 2010. The United States, Brazil, India and Japan, have already embarked on their own biofuels programme, while other countries like Korea and Thailand have set specific targets for biofuels implementation.

SECTOR	ENERGY						
SUB SECTOR	BUILDING FACILITIES	PRODUCTION					
AREA	ENERGY AUDIT	SOLAR THERMAL	SOLAR PHOTOVOLTAIC	SOLAR HOTWATER	BIOMASS	HYDRO	INCINERATION
LEVEL 5	ENERGY AUDIT MANAGER*	SOLAR THERMAL TECHNOLOGY DESIGNER	SOLAR PHOTOVOLTAIC TECHNOLOGY DESIGNER	SOLAR HOTWATER TECHNOLOGY DESIGNER*	BIOMASS TECHNOLOGY DESIGNER	HYDRO TECHNOLOGY DESIGNER	INCINERATION PLANT MANAGER
LEVEL 4	ENERGY AUDIT ASSISTANT MANAGER*	SOLAR THERMAL TECHNOLOGY ASSISTANT DESIGNER	SOLAR PHOTOVOLTAIC TECHNOLOGY ASSISTANT DESIGNER	SOLAR HOTWATER TECHNOLOGY ASSISTANT DESIGNER*	BIOMASS TECHNOLOGY ASSISTANT DESIGNER	HYDRO TECHNOLOGY ASSISTANT DESIGNER	INCINERATION PLANT ASSISTANT MANAGER
LEVEL 3	ENERGY AUDIT TECHNICIAN*	SOLAR THERMAL INSTALLATION & MAINTENANCE INSTALLER	SOLAR PV INSTALLATION & MAINTENANCE INSTALLER	SOLAR HOTWATER INSTALLATION & MAINTENANCE INSTALLER*	BIOMASS INSTALLATION & MAINTENANCE INSTALLER	HYDRO INSTALLATION & MAINTENANCE INSTALLER	INCINERATION PLANT SUPERVISOR
LEVEL 2	ENERGY AUDIT ASSISTANT TECHNICIAN*	SOLAR THERMAL INSTALLATION & MAINTENANCE ASSISTANT INSTALLER	SOLAR PV INSTALLATION & MAINTENANCE ASSISTANT INSTALLER	SOLAR HOTWATER INSTALLATION & MAINTENANCE ASSISTANT INSTALLER*	BIOMASS INSTALLATION & MAINTENANCE ASSISTANT INSTALLER	HYDRO INSTALLATION & MAINTENANCE ASSISTANT INSTALLER	INCINERATION PLANT OPERATOR
LEVEL 1	No Level						

Figure 5.2: *Proposed Green Technology OA Matrix (Energy Subsector)*

* Critical Job Title

SUB SECTOR	BUILDING		
AREA	**CONSTRUCTION**	**MAINTENANCE**	**DEMOLITION**
LEVEL 5	GREEN BUILDING CONSULTANT*	GREEN BUILDING FACILITIES MAINTENANCE MANAGER	BUILDING DEMOLITION MANAGER
LEVEL 4	No Level	GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT MANAGER	BUILDING DEMOLITION ASSISTANT MANAGER
LEVEL 3	No Level	GREEN BUILDING FACILITIES MAINTENANCE TECHNICIAN	BUILDING DEMOLITION TECHNICIAN
LEVEL 2	No Level	GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT TECHNICIAN	BUILDING DEMOLITION ASSISTANT TECHNICIAN
LEVEL 1	No Level		

Figure 5.3: *Proposed Green Technology OA Matrix (Building Subsector)*

* Critical Job Title

SUB SECTOR	WATER AND WASTE MANAGEMENT		
AREA	**SOLID WASTE**	**WATER**	**WASTE WATER**
LEVEL 5	SOLID WASTE MANAGER*	WATER MANAGER	WASTE WATER MANAGER
LEVEL 4	SOLID WASTE ASSISTANT MANAGER*	WATER ASSISTANT MANAGER	WASTE WATER ASSISTANT MANAGER
LEVEL 3	SOLID WASTE TECHNICIAN*	WATER TECHNICIAN	WASTE WATER TECHNICIAN
LEVEL 2	SOLID WASTE ASSISTANT TECHNICIAN*	WATER ASSISTANT TECHNICIAN	WASTE WATER ASSISTANT TECHNICIAN
LEVEL 1	No Level		

Figure 5.4: *Proposed Green Technology OA Matrix (Water and Waste Management sector)*

* Critical Job Title

SUB SECTOR	TRANSPORTATION						
AREA	INFRASTRUCTURE	VEHICLE				FUEL	
		DESIGN	MAINTENANCE			RESEARCH	PRODUCTION
			ELECTRIC CAR	NATURAL GAS VEHICLE	FUEL CELL		
LEVEL 5	GREEN TECHNOLOGY INFRASTRUCTURE FACILITATOR	GREEN TECHNOLOGY VEHICLE DESIGNER	ELECTRIC CAR MAINTENANCE MANAGER	NATURAL GAS VEHICLE MAINTENANCE MANAGER	FUEL CELL VEHICLE MAINTENANCE MANAGER	GREEN TECHNOLOGY FUEL RESEARCH TECHNOLOGIST	GREEN TECHNOLOGY FUEL PRODUCTION MANAGER*
LEVEL 4	GREEN TECHNOLOGY INFRASTRUCTURE ASSISTANT FACILITATOR	GREEN TECHNOLOGY VEHICLE ASSISTANT DESIGNER	ELECTRIC CAR MAINTENANCE ASSISTANT MANAGER	NATURAL GAS VEHICLE MAINTENANCE ASSISTANT MANAGER	FUEL CELL VEHICLE MAINTENANCE ASSISTANT MANAGER	GREEN TECHNOLOGY FUEL RESEARCH ASSISTANT TECHNOLOGIST	GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT MANAGER*
LEVEL 3	No Level	No Level	ELECTRIC CAR MAINTENANCE MECHANIC	NATURAL GAS VEHICLE MAINTENANCE MECHANIC	FUEL CELL VEHICLE MAINTENANCE MECHANIC	No Level	GREEN TECHNOLOGY FUEL PRODUCTION TECHNICIAN*
LEVEL 2	No Level	No Level	ELECTRIC CAR MAINTENANCE ASSISTANT MECHANIC	NATURAL GAS VEHICLE MAINTENANCE ASSISTANT MECHANIC	FUEL CELL VEHICLE MAINTENANCE ASSISTANT MECHANIC	No Level	GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT TECHNICIAN*
LEVEL 1	No Level						

Figure 5.5: *Proposed Green Technology OA Matrix (Transportation Subsector)*

* Critical Job Title

5.2 Entry Level

(i) Entry Level at Level 2

Subsector: Energy, Water and Waste Management

ENERGY	WATER AND WASTE MANAGEMENT
Level 5	Level 5
Level 4	Level 4
Level 3	Level 3
Level 2	Level 2
No Level	No Level

The Energy and Water and Waste Management sectors begin at Level 2, because the work of the Assistant Technician job scope and duties are non routine and require autonomy and responsibility.

(ii) Entry Level at Level 4

Subsector: Building and Transportation

BUILDING	TRANSPORTATION
Level 5	Level 5
Level 4	Level 4
No Level	No Level
No Level	No Level
No Level	No Level

The entry level is at Level 4 for the Building and Transportation sectors. This is because the areas under the Building Construction, Transport Infrastructure, Vehicle Design and Fuel Research sub sectors are highly technical and require the expertise of those with an Engineering qualification or scientific research background.

5.3 Occupational Definition

Under the Green Technology sector, job titles are identified and defined. Each job title is given a job definition as specified. The definition for all job titles can be seen in Annex 2.

5.4 Critical Job Titles and Non Critical Job Titles

For the Green Technology sector, a total of 17 job titles are considered to be critical and 54 job titles are non critical.

(i) CRITICAL JOB TITLES

Based on input from the expert panel members, it can be summarised that the critical job titles are under sub sectors that have an immediate need for skilled and certified personnel.

The first being the energy audit sub sector that requires skilled personnel from the Assistant Technician level up to the Energy Audit Manager level. This is because according to the Energy Commission (Suruhanjaya Tenaga), there is a mandatory requirement where those organisations operating using more than 3 million Watts of electricity for more that 6 months must engage Energy Audit personnel to ensure energy efficiency.

There is also a critical need for Solar Photovoltaic Technology personnel as 1 MW of PV installations are in line,and this would create about 500 full time domestic jobs (designers, installers, administrators, regulators, policy makers, suppliers). With the installation plan of 200 MW Grid connects PV and Off Grid PV systems, this in turn will create around 10,000 highly skilled and knowledge based new jobs between 2010 – 2015.

Malaysia will implement the feed-in tariff (FIT) for renewable energy to enable users to sell excess power to the power grid as early as next year, said Energy, Green Technology and Water Minister Datuk Seri Peter Chin Fah Kui.

He said the Renewable Energy Act, which will introduce the FIT mechanism, is expected to be tabled in the Dewan Rakyat by year-end.

“The FIT is a mechanism that is tried and tested in many advanced countries, notably Germany, as a way to encourage people to use renewable energy such as solar, biomass or wind”. Chin said he believed the incentives to sell excess power derived from renewable energy sources to the grid would encourage more people to adopt renewable energy sources.

Green Building Consultants are also deemed critical as Malaysia pursues to promote the adoption of energy saving and environmental sustainability concepts for buildings.

The need for solid waste management personnel is important in Malaysia because due to the advancement and increase of population, solid waste disposal has also increased. Currently there is a lack of technical expertise necessary for solid waste management planning and operation. Many officers in charge of solid waste management, particularly at the local level, have little or no technical background or training in engineering or management.

With the advent and research of alternative fuel production, trained and skilled personnel under the fuel production sub

sector is important and critical in the near future. Malaysia is rich with sources for alternative or bio fuel, but requires the proper personnel to capitalise on its resources.

The results of the critical job titles analysis are as below:

a) Area : Energy Audit

NO.	JOB TITLE	LEVEL
1	Energy Audit Manager*	L5
2	Energy Audit Assistant Manager*	L4
3	Energy Audit Technician*	L3
4	Energy Audit Assistant Technician*	L2

b) Area : Solar Photovoltaic

NO.	JOB TITLE	LEVEL
1	Solar Photovoltaic Technology Designer*	L5
2	Solar Photovoltaic Technology Assistant Designer*	L4
3	Solar Photovoltaic Installation & Maintenance Installer*	L3
4	Solar Photovoltaic Installation & Maintenance Assistant Installer*	L2

c) Area : Building Construction

NO.	JOB TITLE	LEVEL
1	Green Building Consultant *	L5

d) Area : Solid Waste

NO.	JOB TITLE	LEVEL
1	Solid Waste Manager*	L5
2	Solid Waste Assistant Manager*	L4
3	Solid Waste Technician*	L3
4	Solid Waste Assistant Technician*	L2

e) Area : Fuel Production

NO.	JOB TITLE	LEVEL
1	Green Technology Fuel Production Manager*	L5
2	Green Technology Fuel Production Assistant Manager*	L4
3	Green Technology Fuel Production Technician*	L3
4	Green Technology Fuel Production Assistant Technician*	L2

(ii) Non critical job title

The job titles under this category do not reflect that they are not critical in the industry but only represent categories of job titles that have a sufficient supply of skilled workers in the near future and do not require immediate revision of the National Occupational Skills Standards documents or skills training.

a) Sub Sector : Energy

NO.	JOB TITLE	LEVEL
1	Solar Thermal Technology Designer	L5
2	Solar Thermal Technology Assistant Designer	L4
3	Solar Thermal Installation & Maintenance Installer	L3
4	Solar Thermal Installation & Maintenance Assistant Installer	L2
5	Solar Hotwater Technology Designer	L5
6	Solar Hotwater Technology Assistant Designer	L4
7	Solar Hotwater Installation & Maintenance Installer	L3
8	Solar Hotwater Installation & Maintenance Assistant Installer	L2
9	Biomass Technology Designer	L5
10	Biomass Technology Assistant Designer	L4
11	Biomass Installation & Maintenance Installer	L3
12	Biomass Installation & Maintenance Assistant Installer	L2
13	Hydro Technology Designer	L5
14	Hydro Technology Assistant Designer	L4
15	Hydro Installation & Maintenance Installer	L3
16	Hydro Installation & Maintenance Assistant Installer	L2

17	Incineration Plant Manager	L5
18	Incineration Plant Assistant Manager	L4
19	Incineration Plant Supervisor	L3
20	Incineration Plant Operator	L2

b) Sub Sector : Building

NO.	JOB TITLE	LEVEL
1	Green Building Facilities Maintenance Manager	L5
2	Green Building Facilities Maintenance Assistant Manager	L4
3	Green Building Facilities Maintenance Technician	L3
4	Green Building Facilities Maintenance Assistant Technician	L2
5	Building Demolition Manager	L5
6	Building Demolition Assistant Manager	L4
7	Building Demolition Technician	L3
8	Building Demolition Assistant Technician	L2

c) Area : Water and Waste Management

NO.	JOB TITLE	LEVEL
1	Water Manager	L5
2	Water Assistant Manager	L4
3	Water Technician	L3
4	Water Assistant Technician	L2
5	Waste Water Manager	L5
6	Waste Water Assistant Manager	L4
7	Waste Water Technician	L3
8	Waste Water Assistant Technician	L2

d) Sector : Transportation

NO.	JOB TITLE	LEVEL
1	Green Technology Infrastructure Facilitator	L5
2	Green Technology Infrastructure Assistant Facilitator	L4
3	Green Technology Vehicle Designer	L5
4	Green Technology Vehicle Assistant Designer	L4
5	Electric Car Maintenance Manager	L5

6	Electric Car Maintenance Assistant Manager	L4
7	Electric Car Maintenance Mechanic	L3
8	Electric Car Maintenance Assistant Mechanic	L2
9	Natural Gas Vehicle Maintenance Manager	L5
10	Natural Gas Vehicle Maintenance Assistant Manager	L4
11	Natural Gas Vehicle Maintenance Mechanic	L3
12	Natural Gas Vehicle Maintenance Assistant Mechanic	L2
13	Fuel Cell Vehicle Maintenance Manager	L5
14	Fuel Cell Vehicle Maintenance Assistant Manager	L4
15	Fuel Cell Vehicle Maintenance Mechanic	L3
16	Fuel Cell Vehicle Maintenance Assistant Mechanic	L2
17	Green Technology Fuel Research Technologist	L5
18	Green Technology Fuel Research Assistant Technologist	L4

(iii) Summary of critical and non critical job titles

SUB SECTOR			LEVEL						TOTAL
			NL	L1	L2	L3	L4	L5	
1	Energy	***Critical***	0	0	2	2	2	2	8
		Non-Critical	0	0	5	5	5	5	20
2	Building	***Critical***	0	0	0	0	0	1	1
		Non-Critical	0	0	2	2	2	2	8
3	Water & Waste Management	***Critical***	0	0	1	1	1	1	4
		Non-Critical	0	0	2	2	2	2	8
4	Transportation	***Critical***	0	0	1	1	1	1	4
		Non-Critical	0	0	3	3	6	6	18
			Critical						17
			Non-Critical						54
Total			0	0	16	16	19	20	71

Figure 5.6: *Critical and Non Critical Schedule*

6. CONCLUSION AND RECOMMENDATION

As a result of the Green Technology Industry's Occupational Analysis conducted together with expert panel members from various Green Technology subsectors and organisations, a total of 71 job titles and 4 main sectors have been identified.

The Green Technology Industry is an industry with a great potential. Within the Green Technology Industry, Malaysian-owned companies have ventured into the manufacture of Green Technology products for both the domestic and export markets.

The government's keen interest in developing the Green Technology Industry will allow the workforce in this sector to be formally trained at all levels specified and in turn develop a more progressive and competent workforce for the industry.

Based on the findings obtained, it is recommended so that the skills training for the sector be conducted immediately. This is to ensure that there will be a sector outline for the purpose of industrial recognition, development of the National Occupational Skill Standard (NOSS) and skills student development.

Endowed with strong government support and a substantial human resource, this industry could expand by the tight corporation between government, Green Technology companies and training centres.

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ANNEX 1:

LIST OF PANELS AND FACILITATOR OF THE GREEN TECHNOLOGY INDUSTRY OCCUPATIONAL ANALYSIS DEVELOPMENT

LIST OF PANEL EXPERTS OF THE GREEN TECHNOLOGY INDUSTRY SECTOR OCCUPATIONAL ANALYSIS DEVELOPMENT

NO	NAME	POSITION	EXPERTISE	ORGANISATION
1	DR. BRYAN SIDHU	SENIOR ASSISTANT	GREEN ICT & MANUFACTURING	MATRADE, MITI
2	PUAN ZABEDAH BINTI MOHAMED	MANAGING DIRECTOR	VESSEL TRAFFICS MANAGEMENT & SURVEILLANCE SYSTEM	TRANSMARIS TECHNO – SCIENCES SDN. BHD
3	ENCIK CHEN THIAM LEONG	MANAGING DIRECTOR	GREEN BUILDING, SUSTAINABILITY, ENERGY EFFICIENCY	PRIME TECH ENGINEERS SDN. BHD.
4	ENCIK TIEW BIAW SING	MANAGER	MARITIME SURVEILLANCE	TRANSMARIS TECHNO – SCIENCES SDN. BHD
5	ENCIK RAMLI ABD RAHMAN	HEAD OF ASSISTANT MANAGER	CIVIL ENGINEERING	JABATAN ALAM SEKITAR
6	PUAN NORHASLIZA MOHD MOKHTAR	RESEARCH OFFICER	ENERGY EFFICIENCY & RENEWABLE ENERGY	MALAYSIAN GREEN TECHNOLOGY CORPORATION
7	ENCIK MOK KAM MENG	HEAD ENERGY EFFICIENCY	REGISTER ELECTRICAL ENERGY MANAGER (EEM)	SCHEIDER ELECTRIC INDUSTRIES SDN. BHD.
8	ENCIK ISMAIL BIN ABDULLAH	GREEN TECHNOLOGY ADVISOR	GREEN TECHNOLOGY PRODUCTS & SERVICE	MALAYSIAN GREEN TECHNOLOGY CORPORATION
9	PUAN PUNITHA SILIVARAJOO	HEAD OF ASSISTANT SECRETARY	GREEN TECHNOLOGY DEVELOPMENT	KEMENTERIAN TENAGA, TEKNOLOGI HIJAU & AIR
10.	ENCIK STEVE ANTHONY LOJUNTIN	ENGINEER	GREEN BUILDING	MALAYSIAN GREEN TECHNOLOGY CORPORATION

LIST OF PANEL EXPERTS OF THE GREEN TECHNOLOGY INDUSTRY SECTOR OCCUPATIONAL ANALYSIS DEVELOPMENT

DR. AMIRON BIN ISMAIL	FACILITATOR	PRITEC ACADEMY
PUAN EVARINA BINTI AMIRON	CO-FACILITATOR	PRITEC ACADEMY
CIK RAFIDAH BINTI AMIRRUDIN	SECRETARIAT	PRITEC ACADEMY

ANNEX 2:

OCCUPATIONAL DEFINITION OF THE GREEN TECHNOLOGY OCCUPATIONAL ANALYSIS DEVELOPMENT

SECTOR: ENERGY

ENERGY
LEVEL 2
*ENERGY AUDIT ASSISTANT TECHNICIAN

AN ENERGY AUDIT ASSISTANT TECHNICIAN IS DESIGNATED TO CARRY OUT ENERGY AUDIT, ENSURE ENERGY COST REDUCTION, EFFICIENCY AND ENERGY CONSERVATION, PREPARE SYSTEM EQUIPMENT DRAWING, MAINTENANCE DOCUMENT AND MANUAL, PREPARE SYSTEM EQUIPMENT AUDIT, CARRY OUT SYSTEM EQUIPMENT INSTALLATION, CALIBRATION, RE-COMMISSIONING, TESTING AND MAINTENANCE, PREPARE TESTING EQUIPMENT MANUALS AND MAINTENANCE DOCUMENT.

An Energy Audit Assistant Technician will be able to:

1. Carry out energy audit;
2. Ensure energy cost reduction, efficiency and energy conservation;
3. Prepare system equipment drawing, maintenance document, manual and audit;
4. Carry out system equipment installation, calibration, re-commissioning, system equipment testing and system equipment maintenance;
5. Prepare testing equipment manuals and maintenance document;
6. Prepare testing equipment including calibration;
7. Carry out testing equipment installation, testing, maintenance and re-commissioning;
8. Carry out building testing and maintenance; and
9. Adhere to safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 3
*ENERGY AUDIT TECHNICIAN

AN ENERGY AUDIT TECHNICIAN IS DESIGNATED TO PRODUCE BUILDING MANUAL AND TESTING EQUIPMENT MAINTENANCE DOCUMENT, SYSTEM EQUIPMENT MANUAL, DRAWING, SPARE PARTS LIST AND SYSTEM EQUIPMENT MAINTENANCE DOCUMENT AND TESTING EQUIPMENT MANUALS, CONDUCT BUILDING TESTING, SUPERVISORY DUTIES AND APPLIANCES TESTING AND MONITOR BUILDING MAINTENANCE AND APPLIANCES REQUIREMENT.

An Energy Audit Technician will be able to:

1. Produce building manual and testing equipment maintenance document;
2. Conduct building testing, supervisory duties and appliances testing;
3. Monitor building maintenance and appliances requirement;
4. Coordinate energy cost reduction and energy conservation;
5. Supervise energy audit;
6. Conduct energy production and energy distribution;
7. Conduct system equipment audit and equipment testing;
8. Produce system equipment manual, drawing, spare parts list and system equipment maintenance document;
9. Produce testing equipment manuals;
10. Produce testing equipment maintenance document;
11. Monitor testing equipment installation, testing equipment manpower and re-commissioning;
12. Apply safety and security procedure; and
13. Carry out supervisory functions.

Notes:
*Critical Job Title

ENERGY
LEVEL 4
*ENERGY AUDIT ASSISTANT MANAGER

AN ENERGY AUDIT ASSISTANT MANAGER IS DESIGNATED TO REVIEW AS BUILT CERTIFICATE, AS BUILT DRAWING AND AS BUILT MANUALS, PRODUCE BUILDINGS DRAWINGS, BUILDING DESIGN AND DATA SHEET ANALYSIS AND CONDUCT BUILDING PROCEDURES AND SYSTEM EQUIPMENT MANPOWER.

An Energy Audit Assistant Manager will be able to:

1. Review as built certificate, drawing, manuals, maintenance document and spare part list;
2. Produce building drawing, design and data sheet analysis;
3. Conduct building procedures and system equipment manpower ;
4. Implement energy analysis, energy index, energy tariff and system equipment manual;
5. Liaise energy performance contract;
6. Plan testing equipment installation, manpower, re-commissioning and procedures;
7. Analyse testing equipment specification, drawings, data sheet manuals, calibration, testing, re-commissioning, maintenance document and retrofit;
8. Analyse appliances equipment, testing and appliances evaluation;
9. Plan appliances installation, appliances specification, procedures, spare parts list, procurement and data sheet procedures, specification, spare parts list, drawings and design; and
10. Apply safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 5
*ENERGY AUDIT MANAGER

AN ENERGY AUDIT MANAGER IS DESIGNATED TO DESIGN AS BUILT CERTIFICATE, AS BUILT DRAWING AND AS BUILT MANUALS, VERIFY AS BUILT MAINTENACE DOCUMENT, AS BUILT SPARE PARTS LIST AND BUILDING DRAWING AND VALIDATE BUILDING PROCEDURES, BUILDING ANALYSIS AND BUILDING CERTIFICATION.

An Energy Audit Manager will be able to:

1. Design as built certificate, drawing, manuals, energy performance contract and energy tariff;
2. Verify as built maintenance document, built spare parts list, building drawing and design;
3. Validate building procedures, analysis and building certification;
4. Validate energy audit;
5. Evaluate energy efficiency, production, distribution, analysis, index and energy sources;
6. Verify system equipment drawing, audit, testing and system equipment design ;
7. Evaluate system equipment procedures and manpower;
8. Verify system equipment retrofit, spare parts list and maintenance document;
9. Verify system equipment machinery;
10. Validate system equipment installation;
11. Validation system equipment calibration, re-commissioning, manuals, calibration, testing and maintenance document;
12. Validate testing equipment installation calibration, re-commissioning, manuals, calibration, testing and maintenance document; and
13. Apply safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 2
SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO CARRY OUT STRUCTURAL INTEGRITY, ELECTRICAL SYSTEM AND THERMAL PANEL SYSTEM AND UPGRADE CONTROLLER SYSTEM SOFTWARE.

A Solar Thermal Installation and Maintenance Installer will be able to:

1. Perform basic first aid care and use tools safely
2. Provide protective equipment
3. Evaluate the site survey
4. Provide system components
5. Implement the system documentation site;
6. Implement the restructuring of integrity testing, and
7. Comply with safety procedures.

ENERGY
LEVEL 3
SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO MEASURE SOLAR RADIATION AND TEMPERATURE, INSPECT STRUCTURAL INTEGRITY, ELECTRICAL SYSTEM AND THERMAL PANEL SYSTEM AND UPGRADE CONTROLLER SYSTEM SOFTWARE.

A Solar Thermal Installation and Maintenance Installer will be able to:

1. Measure solar radiation and temperature;
2. Inspect structural integrity, electrical system and thermal panel system;
3. Carry out system functionality testing, system diagnostic testing and troubleshooting procedures;
4. Upgrade controller system software;
5. Repair electrical system, thermal cooling panel system, battery system and structural system;
6. Prepare work schedule and coordinate work assignment; and
7. Carry out supervisory functions.

ENERGY
LEVEL 4
SOLAR THERMAL TECHNOLOGY ASSISTANT DESIGNER

A SOLAR THERMAL TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO ANALYSE ENERGY AUDIT, SITE LOAD AND COMPONENTS REQUIREMENT, ESTIMATE SYSTEM LOSS AND CONFIGURE POWER SUPPLY AUTO SELECTION AND SYSTEM AUTONOMY REQUIREMENTS.

A Solar Thermal Technology Assistant Designer will be able to:

1. Analyse energy audit and site load;
2. Estimate system loss;
3. Configure power supply auto selection and system autonomy requirements;
4. Analyse components requirement;
5. Carry out system design;
6. Analyse system cost;
7. Prepare project definition document; and
8. Adhere to safety and security procedure.

ENERGY
LEVEL 5
SOLAR THERMAL TECHNOLOGY DESIGNER

A SOLAR THERMAL TEHCNOLOGY DESIGNER IS DESIGNATED TO ANALYSE HYBRID POWER SUPPLY AND STRUCTURAL IMPACT, CARRY OUT INSTALLATION DESIGN SCHEDULE, SYSTEM TYPE SELECTION AND MODULE TYPE SELECTION AND PREPARE MILESTONE CHART, PROJECT RESOURCES PLAN AND EQUIPMENT BREAKDOWN PLAN.

A Solar Thermal Tehcnology Designer will be able to:

1. Analyse hybrid power supply and structural impact;
2. Carry out installation design schedule, system type selection and module type selection;
3. Configure work breakdown structure;
4. Prepare milestone chart, project resources plan and equipment breakdown report;
5. Control project tracking;
6. Present project report;
7. Prepare maintenance schedule;
8. Prepare check sheet;
9. Carry out supplier liaison, meeting coordination and quotation evaluation;
10. Approve purchase order;
11. Carry out invoice verification; and
12. Adhere to safety and security procedure.

ENERGY
LEVEL 2
*SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER

A SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER IS DESIGNATED TO CARRY OUT SAFE USE OF TOOLS AND BASIC FIRST AID TREATMENT, PREPARE PROTECTIVE EQUIPMENT AND SYSTEM COMPONENT AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solar Photovoltaic Installation and Maintenance Assistant Installer will be able to:

1. Carry out safe use of tools and basic first aid treatment;
2. Prepare protective equipment and system component;
3. Carry out site survey, inverter mounting and battery mounting;
4. Carry out controller mounting, distribution box mounting and battery system cabling;
5. Carry out photovoltaic panel system cabling;
6. Carry out inverter system cabling;
7. Carry out controller system cabling;
8. Carry out system site documentation;
9. Carry out structural integrity testing; and
10. Adhere to safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 3
*SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO MEASURE SOLAR RADIATION AND TEMPERATURE, CONFIGURE ANGLE OF INCLINATION AND CONTROLLER SYSTEM AND INSPECT ROOF MOUNTED PHOTOVOLTAIC SYSTEM, ELECTRICAL SYSTEM & PHOTOVOLTAIC PANEL SYSTEM.

A Solar Photovoltaic Installation and Maintenance Installer will be able to:

1. Measure solar radiation and temperature;
2. Configure angle of inclination and controller system;
3. Inspect roof mounted photovoltaic system, electrical system and photovoltaic panel system;
4. Carry out standalone photovoltaic system checks, roof mounted photovoltaic assembly and standalone photovoltaic assembly;
5. Carry out schematic plan review, system grounding, system activation and material requisition, staff performance appraisal and inventory inspection;
6. Install distribution box, safety disconnect feature and protection system;
7. Carry out system performance benchmarking, system functionality testing, system diagnostic testing and troubleshooting procedures;
8. Inspect structural integrity, electrical system, photovoltaic panel system, battery system and environmental system;
9. Upgrade controller system software;
10. Repair electrical system, photovoltaic panel system, battery system and structural system;
11. Carry out system functionality testing, client complaint administration and on the job training;
12. Prepare work schedule and coordinate work assignment; and
13. Carry out supervisory functions.

Notes:
*Critical Job Title

ENERGY
LEVEL 4
*SOLAR PHOTOVOLTAIC TECHNOLOGY ASSISTANT DESIGNER

A SOLAR PHOTOVOLTAIC TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO ANALYSE ENERGY AUDIT, SITE LOAD AND COMPONENTS REQUIREMENT, ESTIMATE SYSTEM LOSS AND CONFIGURE POWER SUPPLY AUTO SELECTION AND SYSTEM AUTONOMY REQUIREMENTS.

A Solar Photovoltaic Technology Assistant Designer will be able to:

1. Analyse energy audit, site load and system cost;
2. Estimate system loss;
3. Configure power supply auto selection;
4. Configure system autonomy requirements;
5. Analyse components requirement;
6. Carry out system design;
7. Select over current disconnect device;
8. Carry out controller selection;
9. Carry out requirement gathering;
10. Prepare project definition document; and
11. Adhere to safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 5
*SOLAR PHOTOVOLTAIC TECHNOLOGY DESIGNER

A SOLAR PHOTOVOLTAIC TECHNOLOGY DESIGNER IS DESIGNATED TO ANALYSE HYBRID POWER SUPPLY AND STRUCTURAL IMPACT, CARRY OUT INSTALLATION DESIGN SCHEDULE, SYSTEM TYPE SELECTION AND MODULE TYPE SELECTION AND PREPARE MILESTONE CHART, PROJECT RESOURCES PLAN AND EQUIPMENT BREAKDOWN PLAN.

A Solar Photovoltaic Technology Designer will be able to:

1. Analyse hybrid power supply and structural impact;
2. Carry out installation design schedule, system type selection and module type selection;
3. Carry out battery type selection, inverter selection and wiring schematic design;
4. Carry out utility interconnection point selection, site assessment and environmental analysis;
5. Carry out topology design, roof mounting design and independent array mounting design;
6. Configure work breakdown structure;
7. Prepare milestone chart, project resources plan and equipment breakdown report;
8. Control project tracking;
9. Present project report;
10. Prepare maintenance schedule and check sheet;
11. Carry out supplier liaison, meeting coordination and quotation evaluation;
12. Approve purchase order;
13. Carry out invoice verification; and
14. Adhere to safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 2
SOLAR HOTWATER INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER

A SOLAR HOTWATER INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER IS DESIGNATED TO CARRY OUT SAFE USE OF TOOLS AND BASIC FIRST AID TREATMENT, HOTWATER PANEL SYSTEM CABLING AND CONTROLLER SYSTEM CABLING, PREPARE PROTECTIVE EQUIPMENT AND SYSTEM COMPONENT AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solar Hotwater Installation and Maintenance Assistant Installer will be able to:

1. Carry out safe use of tools and basic first aid treatment;
2. Prepare protective equipment and system component;
3. Carry out hotwater panel system cabling;
4. Carry out controller system cabling;
5. Carry out system site documentation;
6. Carry out structural integrity testing; and
7. Adhere to safety and security procedure.

ENERGY
LEVEL 3
SOLAR HOTWATER INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR HOTWATER INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO CARRY OUT SCHEMATIC PLAN REVIEW AND SYSTEM ACTIVATION, INSTALL DISTRIBUTION BOX, SAFETY DISCONNECT FEATURE AND PROTECTION SYSTEM AND INSPECT STRUCTURAL INTEGRITY, ELECTRICAL SYSTEM AND THERMAL PANEL SYSTEM.

A Solar Hotwater Installation and Maintenance Installer will be able to:

1. Carry out schematic plan review and system activation;
2. Install distribution box, safety disconnect feature and protection system;
3. Carry out system performance benchmarking, system functionality testing and system diagnostic testing and troubleshooting procedures;
4. Inspect structural integrity, electrical system and thermal panel system;
5. Repair electrical system and hotwater panel system;
6. Repair structural system;
7. Carry out system functionality testing, client complaint administration and on the job training; and
8. Carry out supervisory functions.

ENERGY
LEVEL 4
SOLAR HOTWATER TECHNOLOGY ASSISTANT DESIGNER

A SOLAR HOTWATER TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO ANALYSE COMPONENTS REQUIREMENT AND SYSTEM COST, ESTIMATE SYSTEM LOSS AND CONFIGURE POWER SUPPLY AUTO SELECTION AND SYSTEM AUTONOMY REQUIREMENTS.

A Solar Hotwater Technology Assistant Designer will be able to:

1. Estimate system loss;
2. Configure power supply auto selection and system autonomy requirements;
3. Analyse components requirement;
4. Carry out system design;
5. Analyse system cost;
6. Carry out controller selection;
7. Prepare project definition document; and
8. Adhere to safety and security procedure.

ENERGY
LEVEL 5
SOLAR HOTWATER TECHNOLOGY DESIGNER

A SOLAR HOTWATER TECHNOLOGY DESIGNER IS DESIGNATED TO CONFIGURE WORK BREAKDOWN STRUCTURE, CARRY OUT INSTALLATION DESIGN SCHEDULE, SYSTEM TYPE SELECTION AND MODULE TYPE SELECTION AND PREPARE MILESTONE CHART, PROJECT RESOURCES PLAN AND EQUIPMENT BREAKDOWN PLAN.

A Solar Hotwater Technology Designer will be able to:

1. Carry out installation design schedule, system type selection and module type selection;
2. Configure work breakdown structure;
3. Prepare milestone chart, project resources plan and equipment breakdown report;
4. Control project tracking;
5. Present project report;
6. Prepare maintenance schedule and check sheet;
7. Carry out supplier liaison, meeting coordination and quotation evaluation;
8. Approve purchase order;
9. Carry out invoice verification; and
10. Adhere to safety and security procedure.

ENERGY
LEVEL 2
SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO CARRY OUT STRUCTURAL INTEGRITY, ELECTRICAL SYSTEM AND THERMAL PANEL SYSTEM AND UPGRADE CONTROLLER SYSTEM SOFTWARE.

A Solar Thermal Installation and Maintenance Installer will be able to:

1. Perform basic first aid care and use tools safely
2. Provide protective equipment
3. Evaluate the site survey
4. Provide system components
5. Implement the system documentation site;
6. Implement the restructuring of integrity testing, and
7. Comply with safety procedures.

ENERGY
LEVEL 3
SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR THERMAL INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO MEASURE SOLAR RADIATION AND TEMPERATURE, INSPECT STRUCTURAL INTEGRITY, ELECTRICAL SYSTEM AND THERMAL PANEL SYSTEM AND UPGRADE CONTROLLER SYSTEM SOFTWARE.

A Solar Thermal Installation and Maintenance Installer will be able to:

1. Measure solar radiation and temperature;
2. Inspect structural integrity, electrical system and thermal panel system;
3. Carry out system functionality testing, system diagnostic testing and troubleshooting procedures;
4. Upgrade controller system software;
5. Repair electrical system, thermal cooling panel system, battery system and structural system;
6. Prepare work schedule and coordinate work assignment; and
7. Carry out supervisory functions.

ENERGY
LEVEL 4
SOLAR THERMAL TECHNOLOGY ASSISTANT DESIGNER

A SOLAR THERMAL TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO ANALYSE ENERGY AUDIT, SITE LOAD AND COMPONENTS REQUIREMENT, ESTIMATE SYSTEM LOSS AND CONFIGURE POWER SUPPLY AUTO SELECTION AND SYSTEM AUTONOMY REQUIREMENTS.

A Solar Thermal Technology Assistant Designer will be able to:

1. Analyse energy audit and site load;
2. Estimate system loss;
3. Configure power supply auto selection and system autonomy requirements;
4. Analyse components requirement;
5. Carry out system design;
6. Analyse system cost;
7. Prepare project definition document; and
8. Adhere to safety and security procedure.

ENERGY
LEVEL 5
SOLAR THERMAL TECHNOLOGY DESIGNER

A SOLAR THERMAL TEHCNOLOGY DESIGNER IS DESIGNATED TO ANALYSE HYBRID POWER SUPPLY AND STRUCTURAL IMPACT, CARRY OUT INSTALLATION DESIGN SCHEDULE, SYSTEM TYPE SELECTION AND MODULE TYPE SELECTION AND PREPARE MILESTONE CHART, PROJECT RESOURCES PLAN AND EQUIPMENT BREAKDOWN PLAN.

A Solar Thermal Tehcnology Designer will be able to:

1. Analyse hybrid power supply and structural impact;
2. Carry out installation design schedule, system type selection and module type selection;
3. Configure work breakdown structure;
4. Prepare milestone chart, project resources plan and equipment breakdown report;
5. Control project tracking;
6. Present project report;
7. Prepare maintenance schedule;
8. Prepare check sheet;
9. Carry out supplier liaison, meeting coordination and quotation evaluation;
10. Approve purchase order;
11. Carry out invoice verification; and
12. Adhere to safety and security procedure.

ENERGY
LEVEL 2
*SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER

A SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER IS DESIGNATED TO CARRY OUT SAFE USE OF TOOLS AND BASIC FIRST AID TREATMENT, PREPARE PROTECTIVE EQUIPMENT AND SYSTEM COMPONENT AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solar Photovoltaic Installation and Maintenance Assistant Installer will be able to:

1. Carry out safe use of tools and basic first aid treatment;
2. Prepare protective equipment and system component;
3. Carry out site survey, inverter mounting and battery mounting;
4. Carry out controller mounting, distribution box mounting and battery system cabling;
5. Carry out photovoltaic panel system cabling;
6. Carry out inverter system cabling;
7. Carry out controller system cabling;
8. Carry out system site documentation;
9. Carry out structural integrity testing; and
10. Adhere to safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 3
*SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR PHOTOVOLTAIC INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO MEASURE SOLAR RADIATION AND TEMPERATURE, CONFIGURE ANGLE OF INCLINATION AND CONTROLLER SYSTEM AND INSPECT ROOF MOUNTED PHOTOVOLTAIC SYSTEM, ELECTRICAL SYSTEM AND PHOTOVOLTAIC PANEL SYSTEM.

A Solar Photovoltaic Installation & Maintenance Installer will be able to:

1. Measure solar radiation and temperature;
2. Configure angle of inclination and controller system;
3. Inspect roof mounted photovoltaic system, electrical system and photovoltaic panel system;
4. Carry out standalone photovoltaic system checks, roof mounted photovoltaic assembly and standalone photovoltaic assembly;
5. Carry out schematic plan review, system grounding, system activation and material requisition, staff performance appraisal and inventory inspection;
6. Install distribution box, safety disconnect feature and protection system;
7. Carry out system performance benchmarking, system functionality testing, system diagnostic testing and troubleshooting procedures;
8. Inspect structural integrity, electrical system, photovoltaic panel system, battery system and environmental system;
9. Upgrade controller system software;
10. Repair electrical system, photovoltaic panel system, battery system and structural system;
11. Carry out system functionality testing, client complaint administration and on the job training;
12. Prepare work schedule and coordinate work assignment; and
13. Carry out supervisory functions.

ENERGY
LEVEL 4
*SOLAR PHOTOVOLTAIC TECHNOLOGY ASSISTANT DESIGNER

A SOLAR PHOTOVOLTAIC TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO ANALYSE ENERGY AUDIT, SITE LOAD AND COMPONENTS REQUIREMENT, ESTIMATE SYSTEM LOSS AND CONFIGURE POWER SUPPLY AUTO SELECTION AND SYSTEM AUTONOMY REQUIREMENTS.

A Solar Photovoltaic Technology Assistant Designer will be able to:

1. Analyse energy audit, site load and system cost;
2. Estimate system loss;
3. Configure power supply auto selection;
4. Configure system autonomy requirements;
5. Analyse components requirement;
6. Carry out system design;
7. Select over current disconnect device;
8. Carry out controller selection;
9. Carry out requirement gathering;
10. Prepare project definition document; and
11. Adhere to safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 5
*SOLAR PHOTOVOLTAIC TECHNOLOGY DESIGNER

A SOLAR PHOTOVOLTAIC TECHNOLOGY DESIGNER IS DESIGNATED TO ANALYSE HYBRID POWER SUPPLY AND STRUCTURAL IMPACT, CARRY OUT INSTALLATION DESIGN SCHEDULE, SYSTEM TYPE SELECTION AND MODULE TYPE SELECTION AND PREPARE MILESTONE CHART, PROJECT RESOURCES PLAN AND EQUIPMENT BREAKDOWN PLAN.

A Solar Photovoltaic Technology Designer will be able to:

1. Analyse hybrid power supply and structural impact;
2. Carry out installation design schedule, system type selection and module type selection;
3. Carry out battery type selection, inverter selection and wiring schematic design;
4. Carry out utility interconnection point selection, site assessment and environmental analysis;
5. Carry out topology design, roof mounting design and independent array mounting design;
6. Configure work breakdown structure;
7. Prepare milestone chart, project resources plan and equipment breakdown report;
8. Control project tracking;
9. Present project report;
10. Prepare maintenance schedule and check sheet;
11. Carry out supplier liaison, meeting coordination and quotation evaluation;
12. Approve purchase order;
13. Carry out invoice verification; and
14. Adhere to safety and security procedure.

Notes:
*Critical Job Title

ENERGY
LEVEL 2
SOLAR HOTWATER INSTALLATION & MAINTENANCE ASSISTANT INSTALLER

A SOLAR HOTWATER INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER IS DESIGNATED TO CARRY OUT SAFE USE OF TOOLS AND BASIC FIRST AID TREATMENT, HOTWATER PANEL SYSTEM CABLING AND CONTROLLER SYSTEM CABLING, PREPARE PROTECTIVE EQUIPMENT AND SYSTEM COMPONENT AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solar Hotwater Installation and Maintenance Assistant Installer will be able to:

1. Carry out safe use of tools and basic first aid treatment;
2. Prepare protective equipment and system component;
3. Carry out hotwater panel system cabling;
4. Carry out controller system cabling;
5. Carry out system site documentation;
6. Carry out structural integrity testing; and
7. Adhere to safety and security procedure.

ENERGY
LEVEL 3
SOLAR HOTWATER INSTALLATION AND MAINTENANCE INSTALLER

A SOLAR HOTWATER INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO CARRY OUT SCHEMATIC PLAN REVIEW AND SYSTEM ACTIVATION, INSTALL DISTRIBUTION BOX, SAFETY DISCONNECT FEATURE AND PROTECTION SYSTEM AND INSPECT STRUCTURAL INTEGRITY, ELECTRICAL SYSTEM AND THERMAL PANEL SYSTEM.

A Solar Hotwater Installation and Maintenance Installer will be able to:

1. Carry out schematic plan review and system activation;
2. Install distribution box, safety disconnect feature and protection system;
3. Carry out system performance benchmarking, system functionality testing and system diagnostic testing and troubleshooting procedures;
4. Inspect structural integrity, electrical system and thermal panel system;
5. Repair electrical system and hotwater panel system;
6. Repair structural system;
7. Carry out system functionality testing, client complaint administration and on the job training; and
8. Carry out supervisory functions.

ENERGY
LEVEL 4
SOLAR HOTWATER TECHNOLOGY ASSISTANT DESIGNER

A SOLAR HOTWATER TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO ANALYSE COMPONENTS REQUIREMENT AND SYSTEM COST, ESTIMATE SYSTEM LOSS AND CONFIGURE POWER SUPPLY AUTO SELECTION AND SYSTEM AUTONOMY REQUIREMENTS.

A Solar Hotwater Technology Assistant Designer will be able to:

1. Estimate system loss;
2. Configure power supply auto selection and system autonomy requirements;
3. Analyse components requirement;
4. Carry out system design;
5. Analyse system cost;
6. Carry out controller selection;
7. Prepare project definition document; and
8. Adhere to safety and security procedure.

ENERGY
LEVEL 5
SOLAR HOTWATER TECHNOLOGY DESIGNER

A SOLAR HOTWATER TECHNOLOGY DESIGNER IS DESIGNATED TO CONFIGURE WORK BREAKDOWN STRUCTURE, CARRY OUT INSTALLATION DESIGN SCHEDULE, SYSTEM TYPE SELECTION AND MODULE TYPE SELECTION AND PREPARE MILESTONE CHART, PROJECT RESOURCES PLAN AND EQUIPMENT BREAKDOWN PLAN.

A Solar Hotwater Technology Designer will be able to:

1. Carry out installation design schedule, system type selection and module type selection;
2. Configure work breakdown structure;
3. Prepare milestone chart, project resources plan and equipment breakdown report;
4. Control project tracking;
5. Present project report;
6. Prepare maintenance schedule and check sheet;
7. Carry out supplier liaison, meeting coordination and quotation evaluation;
8. Approve purchase order;
9. Carry out invoice verification; and
10. Adhere to safety and security procedure.

ENERGY
LEVEL 2
BIOMASS INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER

A BIOMASS INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER IS DESIGNATED TO CARRY OUT BIOMASS PLAN, ENERGY AUDIT, ENERGY PRODUCTION, BIOMASS WASTE DISPOSAL AND BIOMASS WASTE MANAGEMENT, HANDLE BIOMASS PRODUCT AND ENSURE ENERGY REDUCTION, ENERGY CONSERVATION AND ENERGY EFFICIENCY.

A Biomass Installation and Maintenance Assistant Installer will be able to:

1. Carry out biomass plan, energy audit and energy production ;
2. Maintain biomass equipment;
3. Handle biomass product;
4. Ensure energy cost reduction, conservation and efficiency;
5. Assist in testing lab for quality control & production;
6. Carry out biomass waste disposal and waste management; and
7. Adhere safety and security procedure.

ENERGY
LEVEL 3
BIOMASS INSTALLATION AND MAINTENANCE INSTALLER

A BIOMASS INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO MONITOR BIOMASS PLAN AND ENERGY AUDIT, COORDINATE BIOMASS EQUIPMENT AND BIOMASS PRODUCT AND CARRY OUT TESTING LAB FOR QUALITY CONTROL AND TESTING LAB FOR PRODUCTION.

A Biomass Installation and Maintenance Installer will be able to:

1. Monitor biomass plan;
2. Coordinate biomass equipment and product;
3. Monitor energy audit;
4. Coordinate energy distribution;
5. Carry out testing lab for quality control and production;
6. Coordinate biomass waste disposal and waste management;
7. Adhere to safety and security procedure; and
8. Carry out supervisory functions.

ENERGY
LEVEL 4
BIOMASS TECHNOLOGY ASSISTANT DESIGNER

A BIOMASS TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO PRODUCE BIOMASS PLAN, ANALYSE BIOMASS EQUIPMMENT, BIOMASS PRODUCT, ENERGY COST REDUCTION, ENERGY CONSERVATION AND ENERGY AUDIT, PLAN ENERGY EFFICIENCY, ENERGY DISTRIBUTION AND TESTING LAB FOR QUALITY CONTROL.

A Biomass Technology Assistant Designer will be able to:

1. Carry out technology application;
2. Produce biomass plan;
3. Analyse biomass equipment, biomass product and energy cost reduction and conservation;
4. Analyse energy audit;
5. Plan energy efficiency and energy distribution;
6. Plan testing lab for quality control and production;
7. Plan biomass waste disposal and waste management; and
8. Adhere to safety and security procedure.

ENERGY
LEVEL 5
BIOMASS TECHNOLOGY DESIGNER

A BIOMASS TECHNOLOGY DESIGNER IS DESIGNATED TO DESIGN BIOMASS PLAN, VERIFY BIOMASS EQUIPMENT, BIOMASS PRODUCT, ENERGY COST REDUCTION, ENERGY CONSERVATION, BIOMASS WASTE DISPOSAL AND BIOMASS WASTE MANAGEMENT AND VALIDATE ENERGY AUDIT AND ENERGY EFFICIENCY.

A Biomass Technology Designer will be able to:

1. Analyse technology application and testing lab for quality control and production ;
2. Design biomass plan;
3. Verify biomass equipment, biomass product, energy cost reduction and conservation;
4. Validate energy audit and energy efficiency;
5. Validate energy distribution;
6. Verify biomass waste disposal and waste management; and
7. Adhere safety and security procedure.

ENERGY
LEVEL 2
HYDRO INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER

HYDRO INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER IS DESIGNATED TO ASSIST IN EQUIPMENT PROCUREMENT, EQUIPMENT TRAINING, TESTING EQUIPMENT AND CALIBRATION EQUIPMENT, CARRY OUT INSTALLATION, COMMISSIONING AND MAINTENANCE EQUIPMENT.

Hydro Installation And Maintenance Assistant Installer will be able to:

1. Assist equipment procurement, equipment training, testing and calibration;
2. Carry out equipment installation, commissioning and equipment maintenance;
3. Carry out equipment safe keeping;
4. Interpret spare parts list;
5. Assist in maintenance procurement;
6. Maintain system equipment and machinery spare part
7. Adhere to spare part listing;
8. Maintain drawing materials and manual equipment; and
9. Adhere to safety and security procedure.

ENERGY
LEVEL 3
HYDRO INSTALLATION AND MAINTENANCE INSTALLER

A HYDRO INSTALLATION AND MAINTENANCE INSTALLER IS DESIGNATED TO MONITOR EQUIMENT INSTALLATION, COMMISIONING AND MAINTENANCE, CARRY OUT EQUIPMENT CALIBRATION, EQUIPMENT TESTING AND EQUIPMENT TRAINING AND PRODUCE MAINTENANCE REPORT.

A Hydro Installation and Maintenance Installer will be able to:

1. Monitor equipment installation, equipment commissioning, equipment maintenance and equipment safe keeping;
2. Monitor system equipment;
3. Carry out equipment calibration, equipment testing and equipment training;
4. Carry out in maintenance and spare part procurement;
5. Monitor maintenance of machinery, maintenance installation, testing and materials;
6. Produce maintenance document;
7. Coordinate maintenance manpower;
8. Carry out installation drawings and manual testing;
9. Monitor procurement, machinery, commissioning, maintenance, retrofit, installation, system equipment, training, manpower, testing and calibration schedule;
10. Adhere to safety and security procedure; and
11. Carry out supervisory functions.

ENERGY
LEVEL 4
HYDRO TECHNOLOGY ASSISTANT DESIGNER

A HYDRO TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO PLAN EQUIPMENT PROCUREMENT, EQUIPMENT MACHINERY AND EQUIPMENT INSTALLATION, ANALYSE SYSTEM EQUIPMENT COMMISSIONING, SYSTEM EQUIPMENT AND EQUIPMENT TESTING, SCHEDULES AND PRODUCE EQUIPMENT PROCEDURES.

A Hydro Technology Assistant Designer will be able to:

1. Plan equipment procurement, installation, calibration, safe keeping, training and manpower;
2. Analyse system equipment, equipment testing and commissioning;
3. Produce equipment procedures and specification;
4. Produce equipment design and equipment drawings;
5. Plan maintenance of machinery maintenance installation, maintenance procurement; calibration testing and retrofit;
6. Plan maintenance manpower and maintenance materials;
7. Produce maintenance drawings, maintenance data sheet, maintenance specification, maintenance construction, maintenance management;
8. Plan spare part equipment, procurement, spare part machinery, spare part commissioning; spare part retrofit, spare part installation, spare part system equipment;
9. Analyse spare part testing and spare part safe keeping manual;
10. Plan spare part calibration and spare part management;
11. Produce spare part data sheet, specification and spare part procedures;
12. Conduct spare part testing;
13. Produce spare part design and spare part drawings;
14. Produce system equipment drawings, construction drawings, spare parts drawings, drawings specifications;
15. Plan equipment manual, installation manual, machinery manual, procurement manual;

16. Produce manual of safe keeping;
17. Analyse equipment schedule, procurement schedule, machinery schedule, commissioning schedule, maintenance schedule, retrofit schedule, installation schedule, system equipment schedule, training schedule, manpower schedule, testing schedule and calibration schedule;
18. Produce management schedule, design schedule, document schedule; and
19. Adhere to safety and security procedure.

ENERGY
LEVEL 5
HYDRO TECHNOLOGY DESIGNER

A HYDRO TECHNOLOGY DESIGNER IS DESIGNATED TO VALIDATE EQUIPMENT INSTALLATION, CALIBRATION TESTING AND COMMISSIONING, VERIFY EQUIPMENT RETROFIT, EQUIPMENT DESIGN AND EQUIPMENT DRAWINGS AND EVALUATE MAINTENANCE DESIGN, DRAWINGS AND MAINTENANCE DATA SHEET.

A Hydro Technology Designer will be able to:

1. Validate equipment installation, calibration testing and commissioning;
2. Verify equipment retrofit, equipment design and equipment drawings;
3. Verify spare parts list, maintenance installation, maintenance of machinery, maintenance retrofit and maintenance procurement;
4. Validate transmission grid connected and transmission off grid;
5. Evaluate maintenance design, drawings and maintenance data sheet;
6. Verify maintenance construction, maintenance management and maintenance certification;
7. Verify equipment manual, installation manual, machinery manual and procurement manual;
8. Implement certification schedule;
9. Verify equipment schedule, procurement schedule, machinery schedule, commissioning schedule, maintenance schedule, retrofit schedule, installation schedule, system equipment schedule, training schedule, manpower schedule, testing schedule and calibration schedule, management schedule, design schedule and document schedule; and
10. Adhere to safety and security procedure.

ENERGY
LEVEL 2
HYDRO INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER

HYDRO INSTALLATION AND MAINTENANCE ASSISTANT INSTALLER IS DESIGNATED TO ASSIST IN EQUIPMENT PROCUREMENT, EQUIPMENT TRAINING, TESTING EQUIPMENT AND CALIBRATION EQUIPMENT, CARRY OUT INSTALLATION, COMMISSIONING AND MAINTENANCE EQUIPMENT.

Hydro Installation And Maintenance Assistant Installer will be able to:

1. Assist equipment procurement, equipment training, testing and calibration;
2. Carry out equipment installation, commissioning and equipment maintenance;
3. Carry out equipment safe keeping;
4. Interpret spare parts list;
5. Assist in maintenance procurement;
6. Maintain system equipment and machinery spare part
7. Adhere to spare part listing;
8. Maintain drawing materials and manual equipment; and
9. Adhere to safety and security procedure.

ENERGY
LEVEL 3
HYDRO INSTALLATION AND MAINTENANCE INSTALLER

A HYDRO INSTALLATION & MAINTENANCE INSTALLER IS DESIGNATED TO MONITOR EQUIMENT INSTALLATION, COMMISIONING AND MAINTENANCE, CARRY OUT EQUIPMENT CALIBRATION, EQUIPMENT TESTING AND EQUIPMENT TRAINING AND PRODUCE MAINTENANCE REPORT.

A Hydro Installation & Maintenance Installer will be able to:

1. Monitor equipment installation, equipment commissioning, equipment maintenance and equipment safe keeping;
2. Monitor system equipment;
3. Carry out equipment calibration, equipment testing and equipment training;
4. Carry out in maintenance and spare part procurement;
5. Monitor maintenance of machinery, maintenance installation, testing and materials;
6. Produce maintenance document;
7. Coordinate maintenance manpower;
8. Carry out installation drawings and manual testing;
9. Monitor procurement, machinery, commissioning, maintenance, retrofit, installation, system equipment, training, manpower, testing and calibration schedule;
10. Adhere to safety and security procedure; and
11. Carry out supervisory functions.

ENERGY
LEVEL 4
HYDRO TECHNOLOGY ASSISTANT DESIGNER

A HYDRO TECHNOLOGY ASSISTANT DESIGNER IS DESIGNATED TO PLAN EQUIPMENT PROCUREMENT, EQUIPMENT MACHINERY AND EQUIPMENT INSTALLATION, ANALYSE SYSTEM EQUIPMENT COMMISSIONING, SYSTEM EQUIPMENT AND EQUIPMENT TESTING, SCHEDULES AND PRODUCE EQUIPMENT PROCEDURES.

A Hydro Technology Assistant Designer will be able to:

1. Plan equipment procurement, installation, calibration, safe keeping, training and manpower;
2. Analyse system equipment, equipment testing and commissioning;
3. Produce equipment procedures and specification;
4. Produce equipment design and equipment drawings;
5. Plan maintenance of machinery maintenance installation, maintenance procurement; calibration testing and retrofit;
6. Plan maintenance manpower and maintenance materials;
7. Produce maintenance drawings, maintenance data sheet, maintenance specification, maintenance construction, maintenance management;
8. Plan spare part equipment, procurement, spare part machinery, spare part commissioning; spare part retrofit, spare part installation, spare part system equipment;
9. Analyse spare part testing and spare part safe keeping manual;
10. Plan spare part calibration and spare part management;
11. Produce spare part data sheet, specification and spare part procedures;
12. Conduct spare part testing;
13. Produce spare part design and spare part drawings;
14. Produce system equipment drawings, construction drawings, spare parts drawings, drawings specifications;
15. Plan equipment manual, installation manual, machinery manual, procurement manual;
16. Produce manual of safe keeping;

17. Analyse equipment schedule, procurement schedule, machinery schedule, commissioning schedule, maintenance schedule, retrofit schedule, installation schedule, system equipment schedule, training schedule, manpower schedule, testing schedule and calibration schedule;
18. Produce management schedule, design schedule, document schedule; and
19. Adhere to safety and security procedure.

ENERGY
LEVEL 5
HYDRO TECHNOLOGY DESIGNER

A HYDRO TECHNOLOGY DESIGNER IS DESIGNATED TO VALIDATE EQUIPMENT INSTALLATION, CALIBRATION TESTING AND COMMISSIONING, VERIFY EQUIPMENT RETROFIT, EQUIPMENT DESIGN AND EQUIPMENT DRAWINGS AND EVALUATE MAINTENANCE DESIGN, DRAWINGS AND MAINTENANCE DATA SHEET.

A Hydro Technology Designer will be able to:

1. Validate equipment installation, calibration testing and commissioning;
2. Verify equipment retrofit, equipment design and equipment drawings;
3. Verify spare parts list, maintenance installation, maintenance of machinery, maintenance retrofit and maintenance procurement;
4. Validate transmission grid connected and transmission off grid;
5. Evaluate maintenance design, drawings and maintenance data sheet;
6. Verify maintenance construction, maintenance management and maintenance certification;
7. Verify equipment manual, installation manual, machinery manual and procurement manual;
8. Implement certification schedule;
9. Verify equipment schedule, procurement schedule, machinery schedule, commissioning schedule, maintenance schedule, retrofit schedule, installation schedule, system equipment schedule, training schedule, manpower schedule, testing schedule and calibration schedule, management schedule, design schedule and document schedule; and
10. Adhere to safety and security procedure.

ENERGY
LEVEL 2
INCINERATION PLANT OPERATOR

AN INCINERATION PLANT OPERATOR IS DESIGNATED TO OBTAIN AND RECORD INCINERATION PROCESS PRODUCTION PARAMETERS, MAINTAIN INCINERATION PROCESS THROUGH DISTRIBUTED CONTROL SYSTEM (DCS), CARRY OUT INCINERATION PLANT MAINTENANCE, ENSURE ALL INCINERATION PLANT SAFETY DEVICES ARE CHECKED REGULARLY AND IN OPERATIONAL MODE.

The individual will be able to:

1. Obtain incineration process production parameter;
2. Record incineration process production parameter;
3. Maintain incineration process through Distributed Control System (DCS);
4. Carry out incineration plant maintenance;
5. Ensure all incineration plant safety devices are checked regularly and in operational mode;
6. Assist in incineration process problem troubleshooting activities; and
7. Carry out supervisory functions.

ENERGY
LEVEL 3
INCINERATION PLANT SUPERVISOR

AN INCINERATION PLANT SUPERVISOR IS DESIGNATED TO SUPERVISE INCINERATION PROCESS PRODUCTION PARAMETER RECORDING ACTIVITIES, CARRY OUT INCINERATION PROCESS THROUGH DISTRIBUTED CONTROL SYSTEM (DCS), SUPERVISE INCINERATION PLANT MAINTENANCE, ENSURE ALL INCINERATION PLANT SAFETY DEVICES ARE CHECKED REGULARLY AND IN OPERATIONAL MODE, TROUBLESHOOT AND REPAIR INCINERATION PROCESS PROBLEM.

The individual will be able to:

1. Supervise incineration process production parameter recording activities;
2. Carry out incineration process through Distributed Control System (DCS);
3. Supervise incineration plant maintenance;
4. Ensure all incineration plant safety devices are checked regularly and in operational mode;
5. Troubleshoot and repair incineration process problem; and
6. Adhere to safety and security procedure.

ENERGY
LEVEL 4
INCINERATION PLANT ASSISTANT MANAGER

AN INCINERATION PLANT ASSISTANT MANAGER IS DESIGNATED TO ANALYSE INCINERATION PROCESS PRODUCTION PARAMETER RECORDING ACTIVITIES, MONITOR INCINERATION PROCESS THROUGH DISTRIBUTED CONTROL SYSTEM (DCS), IMPLEMENT INCINERATION PLANT MAINTENANCE AND COORDINATE ALL INCINERATION PLANT SAFETY DEVICES ARE CHECKED REGULARLY AND IN OPERATIONAL MODE.

An Incineration Plant Assistant Manager will be able to:

1. Analyse incineration process production parameter recording activities;
2. Monitor incineration process through Distributed Control System (DCS);
3. Implement incineration plant maintenance;
4. Coordinate personnel so that all incineration plant safety devices are checked regularly and in operational mode;
5. Produce solution for incineration process problem; and
6. Adhere to safety and security procedure.

ENERGY
LEVEL 5
INCINERATION PLANT MANAGER

AN INCINERATION PLANT MANAGER IS DESIGNATED TO DETERMINE INCINERATION PROCESS PRODUCTION PARAMETER RECORDING ACTIVITIES, PLAN INCINERATION PROCESS THROUGH DISTRIBUTED CONTROL SYSTEM (DCS), SUPERVISE INCINERATION PLANT MAINTENANCE AND VERIFY SOLUTION FOR INCINERATION PROCESS PROBLEM.

An Incineration Plant Manager will be able to:

1. Determine required incineration process production parameter recording activities;
2. Plan incineration process through Distributed Control System (DCS);
3. Conduct incineration plant maintenance;
4. Implement incineration plant safety devices inspection schedule;
5. Verify solution for incineration process problem; and
6. Adhere to safety and security procedure.

SECTOR: BUILDING

BUILDING
LEVEL 5
GREEN BUILDING CONSULTANT

A GREEN BUILDING CONSULTANT IS DESIGNATED TO PLAN CONSTRUCTION DESIGN, CONDUCT CONSTRUCTION TESTING, MANPOWER, INSTALLATION, MAINTENANCE AND CERTIFICATION, VALIDATE CONSTRUCTION INSTALLATION, MAINTENANCE, EVALUATION AND VALIDATE CONSTRUCTION MANUALS.

The individual will be able to:

1. Design construction drawings;
2. Plan construction audit, drawings, construction equipments, construction machinery, design and commissioning;
3. Plan construction procedures and construction specification;
4. Conduct construction testing;
5. Verify construction tender, construction retrofit, construction analysis, construction materials, manpower and building certification;
6. Validate construction installation, maintenance, evaluation;
7. Validate construction manuals; and
8. Adhere to safety and security procedure.

BUILDING
LEVEL 2
GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT TECHNICIAN

A GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT TECHNICIAN IS DESIGNATED TO ASSIST PREPARING MAINTENANCE WORK SHEET, CARRY OUT MAINTENANCE REPAIR AND MAINTENANCE CHEMICALS, EXECUTE MAINTENANCE SPARE PART AND EQUIPMENT AND PREPARE MAINTENANCE SCHEDULE.

The individual will be able to:

1. Assist preparing maintenance work sheet;
2. Interpret maintenance manual
3. Carry out maintenance repair;
4. Carry out maintenance chemicals;
5. Prepare maintenance schedule; and
6. Execute maintenance spare part & equipment.

BUILDING
LEVEL 3
GREEN BUILDING FACILITIES MAINTENANCE TECHNICIAN

A GREEN BUILDING FACILITIES MAINTENANCE TECHNICIAN IS DESIGNATED TO SUPERVISE MAINTENANCE REPAIR, MAINTENANCE SPARE PART, MAINTENANCE SCHEDULE PREPARATION, CONDUCT MAINTENANCE MANUAL AND PREPARE MAINTENANCE WORKSHEET.

The individual will be able to:

1. Supervise maintenance repair;
2. Supervise maintenance spare part;
3. Supervise maintenance schedule preparation;
4. Supervise maintenance chemicals;
5. Prepare maintenance work sheet;
6. Conduct maintenance manual; and
7. Carry out supervisory functions.

BUILDING
LEVEL 4
GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT MANAGER

A GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT MANAGER IS DESIGNATED TO ANALYSE MAINTENANCE CHEMICALS AND MAINTENANCE MANUAL, DESIGN MAINTENANCE WORK SHEET, CONDUCT MAINTENANCE REPAIR AND SPARE PART MAINTENANCE AND PLAN MAINTENANCE SCHEDULE AND EQUIPMENT MAINTENANCE.

The individual will be able to:

1. Conduct maintenance repair;
2. Conduct spare part maintenance;
3. Analyse maintenance chemicals;
4. Analyse maintenance manual
5. Design maintenance work sheet;
6. Plan maintenance schedule; and
7. Plan equipment maintenance.

BUILDING
LEVEL 5
GREEN BUILDING FACILITIES MAINTENANCE MANAGER

A GREEN BUILDING FACILITIES MAINTENANCE MANAGER IS DESIGNATED TO VERIFY MAINTENANCE SPARE PART, MAINTENANCE REPAIR, MAINTENANCE SCHEDULE AND MAINTENANCE EQUIPMENT, VALIDATE MAINTENANCE SPARE PART & EVALUATE MAINTENANCE CHEMICALS.

The individual will be able to:

1. Verify maintenance repair;
2. Validate maintenance spare part;
3. Verify maintenance schedule;
4. Verify maintenance equipment.
5. Evaluate maintenance chemicals;
6. Evaluate maintenance work sheet; and
7. Evaluate maintenance manual;

BUILDING
LEVEL 2
GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT TECHNICIAN

A GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT TECHNICIAN IS DESIGNATED TO ASSIST PREPARING MAINTENANCE WORK SHEET, CARRY OUT MAINTENANCE REPAIR AND MAINTENANCE CHEMICALS, EXECUTE MAINTENANCE SPARE PART AND EQUIPMENT AND PREPARE MAINTENANCE SCHEDULE.

The individual will be able to:

1. Assist preparing maintenance work sheet;
2. Interpret maintenance manual
3. Carry out maintenance repair;
4. Carry out maintenance chemicals;
5. Prepare maintenance schedule; and
6. Execute maintenance spare part & equipment.

BUILDING
LEVEL 3
GREEN BUILDING FACILITIES MAINTENANCE TECHNICIAN

A GREEN BUILDING FACILITIES MAINTENANCE TECHNICIAN IS DESIGNATED TO SUPERVISE MAINTENANCE REPAIR, MAINTENANCE SPARE PART, MAINTENANCE SCHEDULE PREPARATION, CONDUCT MAINTENANCE MANUAL AND PREPARE MAINTENANCE WORKSHEET.

The individual will be able to:

1. Supervise maintenance repair;
2. Supervise maintenance spare part;
3. Supervise maintenance schedule preparation;
4. Supervise maintenance chemicals;
5. Prepare maintenance work sheet;
6. Conduct maintenance manual; and
7. Carry out supervisory functions.

BUILDING
LEVEL 4
GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT MANAGER

A GREEN BUILDING FACILITIES MAINTENANCE ASSISTANT MANAGER IS DESIGNATED TO ANALYSE MAINTENANCE CHEMICALS AND MAINTENANCE MANUAL, DESIGN MAINTENANCE WORK SHEET, CONDUCT MAINTENANCE REPAIR AND SPARE PART MAINTENANCE AND PLAN MAINTENANCE SCHEDULE AND EQUIPMENT MAINTENANCE.

The individual will be able to:

1. Conduct maintenance repair;
2. Conduct spare part maintenance;
3. Analyse maintenance chemicals;
4. Analyse maintenance manual
5. Design maintenance work sheet;
6. Plan maintenance schedule; and
7. Plan equipment maintenance.

BUILDING
LEVEL 5
GREEN BUILDING FACILITIES MAINTENANCE MANAGER

A GREEN BUILDING FACILITIES MAINTENANCE MANAGER IS DESIGNATED TO VERIFY MAINTENANCE SPARE PART, MAINTENANCE REPAIR, MAINTENANCE SCHEDULE AND MAINTENANCE EQUIPMENT, VALIDATE MAINTENANCE SPARE PART AND EVALUATE MAINTENANCE CHEMICALS.

The individual will be able to:

1. Verify maintenance repair;
2. Validate maintenance spare part;
3. Verify maintenance schedule;
4. Verify maintenance equipment.
5. Evaluate maintenance chemicals;
6. Evaluate maintenance work sheet; and
7. Evaluate maintenance manual;

BUILDING
LEVEL 2
BUILDING DEMOLITION ASSISTANT TECHNICIAN

A BUILDING DEMOLITION ASSISTANT TECHNICIAN IS DESIGNATED TO ASSIST DEMOLITION CONTRACTOR, PREPARE DEMOLITION DATA SHEET, CARRY OUT DEMOLITION DISPOSAL AND MAINTAIN CONSTRUCTION DEMOLITION WASTE.

The individual will be able to:

1. Assist demolition contractor;
2. Assist in preparing demolition drawings;
3. Assist demolition analysis;
4. Prepare demolition data sheet;
5. Carry out demolition disposal;
6. Operate demolition machinery;
7. Maintain construction demolition waste;
8. Adhere to safety and security procedure; and
9. Adhere to demolition regulation.

BUILDING
LEVEL 3
BUILDING DEMOLITION TECHNICIAN

A BUILDING DEMOLITION TECHNICIAN IS DESIGNATED TO PREPARE DEMOLITION DRAWINGS, INTERPRET DEMOLITION MANUAL AND CARRY OUT DEMOLITION WORK, DEMOLITION ANALYSIS AND SUPERVISORY FUNCTIONS.

The individual will be able to:

1. Interpret demolition manual;
2. Prepare demolition drawings;
3. Carry out demolition work;
4. Carry out demolition analysis;
5. Monitor demolition data sheet;
6. Monitor construction demolition waste;
7. Supervise demolition disposal;
8. Supervise demolition source;
9. Adhere to demolition regulation;
10. Adhere to safety and security procedure; and
11. Carry out supervisory functions.

BUILDING
LEVEL 4
BUILDING DEMOLITION ASSISTANT MANAGER

A BUILDING DEMOLITION ASSISTANT MANAGER IS DESIGNATED TO PRODUCE DEMOLITION DATA SHEET, ANALYSE DEMOLITION MANUAL AND DRAWINGS, PLAN DEMOLITION ANALYSIS, DEMOLITION SCHEDULE, DEMOLITION MACHINERY, DEMOLITION WASTE MANAGEMENT AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

The individual will be able to:

1. Produce demolition data sheet;
2. Analyse demolition manual;
3. Analyse demolition drawings;
4. Plan demolition analysis;
5. Plan demolition schedule;
6. Plan construction demolition waste management;
7. Plan demolition disposal;
8. Plan demolition source;
9. Adhere to safety and security procedure; and
10. Adhere to demolition regulation.

BUILDING
LEVEL 5
BUILDING DEMOLITION MANAGER

ABUILDING DEMOLITION MANAGER IS DESIGNATED TO VERIFY DEMOLITION ANALYSIS, DEMOLITION DATA SHEET, DEMOLITION DRAWINGS, VALIDATE DEMOLITION DRAWINGS, CONSTRUCTION DRAWINGS AND DEMOLITION SOURCE AND ADHERE TO DEMOLITION REGULATION.

The individual will be able to:

1. Verify demolition analysis;
2. Verify demolition data sheet;
3. Verify demolition disposal;
4. Validate demolition drawings;
5. Validate construction demolition waste;
6. Validate demolition source;
7. Adhere to demolition regulation; and
8. Adhere to safety and security procedure.

SECTOR: WATER AND WASTE MANAGEMENT

WATER AND WASTE MANAGEMENT
LEVEL 2
*SOLID WASTE ASSISTANT TECHNICIAN

A SOLID WASTE ASSISTANT TECHNICIAN IS DESIGNATED TO OBTAIN SOLID WASTE PROCESS PRODUCTION PARAMETER, RECORD SOLID WASTE PROCESS PRODUCTION PARAMETER, CARRY OUT SOLID WASTE MAINTENANCE, ASSIST IN SOLID WASTE PROCESS PROBLEM TROUBLESHOOTING ACTIVITIES AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solid Waste Assistant Technician will be able to:

1. Obtain solid waste process production parameter;
2. Record solid waste process production parameter;
3. Carry out solid waste maintenance;
4. Ensure all solid waste safety devices are checked regularly and in operational mode;
5. Carry out collection, transportation and disposal of solid waste from households, industries, commercial, institutions or any type of premises that generate solid waste such as domestic waste, garden waste, bulky waste etc.
6. Assist in solid waste process problem troubleshooting activities; and
7. Adhere to safety and security procedure.

Note:
*Critical Job Titles

WATER AND WASTE MANAGEMENT
LEVEL 3
*SOLID WASTE TECHNICIAN

A SOLID WASTE TECHNICIAN IS DESIGNATED TO SUPERVISE SOLID WASTE PROCESS PRODUCTION PARAMETER RECORDING ACTIVITIES, SOLID WASTE MAINTENANCE, ENSURE ALL SOLID WASTE SAFETY DEVICES ARE CHECKED REGULARLY AND IN OPERATIONAL MODE, TROUBLESHOOT AND REPAIR SOLID WASTE PROCESS PROBLEM AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solid Waste Technician will be able to:

1. Supervise solid waste process production parameter recording activities;
2. Supervise solid waste maintenance;
3. Ensure all solid waste safety devices are checked regularly and in operational mode;
4. Troubleshoot and repair solid waste process problem;
5. Supervise collection, transportation and disposal of solid waste form households, industries, commercial, institutions or any type of premises that generate solid waste such as domestic waste, garden waste, bulky waste etc.
6. Adhere to safety and security procedure; and
7. Carry out supervisory functions.

Note:
*Critical Job Titles

WATER AND WASTE MANAGEMENT
LEVEL 4
*SOLID WASTE ASSISTANT MANAGER

A SOLID WASTE ASSISTANT MANAGER IS DESIGNATED TO ANALYSE SOLID WASTE PROCESS PRODUCTION PARAMETER RECORDING ACTIVITIES, IMPLEMENT SOLID WASTE MAINTENANCE, COORDINATE PERSONNEL SO THAT ALL SOLID WASTE PLANT SAFETY ARE CHECKED REGULARLY AND IN OPERATIONAL MODE, PRODUCE SOLUTION FOR SOLID WASTE PROCESS PROBLEM AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solid Waste Assistant Manager will be able to:

1. Analyse solid waste process production parameter recording activities;
2. Implement solid waste maintenance;
3. Coordinate personnel so that all solid waste plant safety devices are checked regularly and in operational mode;
4. Coordinate collection, transportation and disposal of solid waste from households, industries, commercial, institutions or any type of premises that generate solid waste such as domestic waste, garden waste, bulky waste etc.
5. Produce solution for solid waste process problem; and
6. Adhere to safety and security procedure.

Note:
*Critical Job Titles

WATER AND WASTE MANAGEMENT
LEVEL 5
*SOLID WASTE MANAGER

A SOLID WASTE MANAGER IS DESIGNATED TO DETERMINE REQUIRED SOLID WASTE PROCESS PRODUCTION PARAMETER RECORDING ACTIVITIES, CONDUCT SOLID WASTE MAINTENANCE, VERIFY SOLUTION FOR SOLID WASTE PROCESS PROBLEM AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Solid Waste Manager will be able to:

1. Determine required solid waste process production parameter recording activities;
2. Conduct solid waste maintenance;
3. Implement solid waste safety devices inspection schedule;
4. Verify collection, transportation and disposal of solid waste from households, industries, commercial, institutions or any type of premises that generate solid waste such as domestic waste, garden waste, bulky waste etc;
5. Supervises the safe and efficient transport and disposal of solid waste, including household, industrial, infectious, medical, and household hazardous materials;
6. Supervises ancillary solid waste field operations, including equipment operations and repair, recycling, and enforcement of refuse disposal laws;
7. Coordinates solid waste processing operations with planning and engineering staff;
8. Manages the development, revision, and implementation of policies and procedures for solid waste field operations;
9. Selects and trains operations staff;
10. Verify solution for solid waste process problem; and
11. Adhere to safety and security procedure.

Note:
*Critical Job Titles

WATER AND WASTE MANAGEMENT
LEVEL 2
WATER ASSISTANT TECHNICIAN

A WATER ASSISTANT TECHNICIAN IS DESIGNATED TO MAINTAIN OFFICE AND PLANT EQUIPMENT AND MAKING MINOR REPAIRS, OPERATE MACHINERY RELATED TO STORAGE AND MATERIAL MOVING SUCH AS FORKLIFT AND CRANE, PERFORM RELATED DUTIES AS REQUIRED IN DAILY PLANT OPERATIONS, ASSEMBLE TOOLS AND EQUIPMENT AND DELIVERING AND INSTALLING SUPPLY / EQUIPMENT.

A Water Assistant Technician will be able to:

1. Maintaining office and plant equipment and making minor repairs;
2. Operating machinery related to storage and material moving such as forklift and crane;
3. Perform related duties as required in daily plant operations;
4. Assembling tools and equipment;
5. Delivering and installing supply / equipment; and
6. Adhere to safety and security procedure.

WATER AND WASTE MANAGEMENT
LEVEL 3
WATER TECHNICIAN

A WATER TECHNICIAN IS DESIGNATED TO SUPERVISE OFFICE AND PLANT EQUIPMENT AND MAKING MINOR REPAIRS, COORDINATE MACHINERY RELATED TO STORAGE AND MATERIAL MOVING SUCH AS FORKLIFT AND CRANE, MONITOR RELATED DUTIES AS REQUIRED IN DAILY PLANT OPERATIONS, MONITOR TOOLS AND EQUIPMENT AND MAINTAIN AND INSTALLING SUPPLY / EQUIPMENT.

A Water Technician will be able to:

1. Supervise office and plant equipment and making minor repairs;
2. Coordinate machinery related to storage and material moving such as forklift and crane;
3. Monitor related duties as required in daily plant operations;
4. Monitor tools and equipment;
5. Maintain and installing supply / equipment;
6. Adhere to safety and security procedure; and
7. Carry out supervisory functions.

WATER AND WASTE MANAGEMENT
LEVEL 4
WATER ASSISTANT MANAGER

A WATER ASSISTANT MANAGER IS DESIGNATED TO COORDINATE SCHEDULE SAMPLING ACTIVITES, WATER QUALITY TESTING, SERVICE AND MAINTENANCE WORK, CONDUCT SANITARY SURVEY AND VERIFY TREATMENT CHEMICALS QUALITY ASSURANCE.

A Water Assistant Manager will be able to:

1. Coordinate schedule sampling activities, water quality testing and M&E installation testing;
2. Conduct sanitary survey;
3. Verify treatment chemicals quality assurance;
4. Coordinate service and maintenance work;
5. Supervise M & E outsourcing work;
6. Carry out technical audit, corrective action work and government authorities compliance work;
7. Facilitate SHEQ authority inspection;
8. Carry out medical surveillance work;
9. Coordinate repairing work;
10. Perform meter management program;
11. Carry out new reticulation work;
12. Develop asset management database;
13. Collect water demand data;
14. Carry out project supervision; and
15. Adhere to safety and security procedure.

WATER AND WASTE MANAGEMENT
LEVEL 5
WATER MANAGER

A WATER MANAGER IS DESIGNATED TO ANALYSE WATER SAMPLING DATA, ADMINISTER WATER QUALITY INFORMATION SYSTEM, MAINTAIN LAB INSTRUMENTS QUALITY CONTROL, VERIFY WATER SAMPLING RESULT, CORRECTIVE ACTION WORK AND DEVELOP WATER QUALITY ASSURANCE PROGRAM.

A Water Manager will be able to:

1. Analyse water sampling data;
2. Administer water quality information system;
3. Maintain lab instruments quality control;
4. Verify water sampling result and correction action work;
5. Develop water quality assurance program;
6. Coordinate testing M & E installation commissioning;
7. Provide advisory and consultancy services;
8. Prepare technical audit schedule;
9. Evaluate audit findings schedule;
10. Organise SHEQ program and NRW data;
11. Create SHEQ standard procedure;
12. Carry out SHEQ audit program and water network modeling ;
13. Establish SHEQ policy, NRW zones and NRW level;
14. Develop risk management plan;
15. Certify capital works commissioning;
16. Prepare designing material requisition, departmental budget and project budget;
17. Participate one stop centre feedback;
18. Coordinate external audit program;
19. Prepare project schedule; and
20. Adhere to safety and security procedure.

WATER AND WASTE MANAGEMENT
LEVEL 2
WASTE WATER ASSISTANT TECHNICIAN

A WASTE WATER ASSISTANT TECHNICIAN IS DESIGNATED TO CARRY OUT ODOUR CONTROL AND NOISE LEVEL CONTROL, INSPECT SLUDGE PUMP CONDITION, MECHANICAL SCREEN CONDITION, BLOWER ROOM, GRIT AND GREASE TANK CLASSIFIER, RAW SEWAGE PUMP CONDITION, EFFLUENT DISCHARGE PUMP, BAFFLE V-NOTCH CONDITION AND CLARIFIER WEIR SYSTEM AND VERIFY REPAIR WORK REPORT.

A Waste Water Assistant Technician will be able to:

1. Carry out odour control and noise level control;
2. Inspect sludge pump condition, mechanical screen condition and blower room;
3. Inspect grit and grease tank classifier;
4. Inspect raw sewage pump condition, effluent discharge pump and baffle v-notch condition;
5. Inspect clarifier weir system;
6. Prepare instrumentation inspection report;
7. Prepare waste water treatment plant operation report;
8. Prepare sludge treatment work report;
9. Prepare repair work report;
10. Verify repair work report; and
11. Adhere to safety and security procedure.

WATER AND WASTE MANAGEMENT
LEVEL 3
WASTE WATER TECHNICIAN

A WASTE WATER TECHNICIAN IS DESIGNATED TO PREPARE MECHANICAL INSPECTION REPORT, VERIFY MECHANICAL INSPECTION WORK, BIOLOGICAL INSPECTION REPORT, INSTRUMENTATION INSPECTION REPORT, WASTE WATER TREATMENT PLANT OPERATION REPORT, SLUDGE TREATMENT REPORT, REPAIR WORK REPORT AND DAILY INSPECTION REPORT AND CONDUCT SAFETY BRIEFING AND STAFF DEVELOPMENT PROGRAM.

A Waste Water Technician will be able to:

1. Prepare mechanical inspection report and job schedule;
2. Verify mechanical inspection work, biological inspection report and instrumentation inspection report;
3. Verify waste water treatment plant operation report;
4. Verify sludge treatment report;
5. Verify repair work report;
6. Conduct safety briefing;
7. Monitor work progress;
8. Conduct morning briefing;
9. Conduct staff development program;
10. Verify daily inspection report;
11. Adhere to safety and security procedure; and
12. Carry out supervisory functions.

WATER AND WASTE MANAGEMENT
LEVEL 4
WASTE WATER ASSISTANT MANAGER

A WASTE WATER ASSISTANT MANAGER IS DESIGNATED TO ANALYSE MECHANICAL INSPECTION REPORT, PLAN MECHANICAL INSPECTION WORK, BIOLOGICAL INSPECTION REPORT, INSTRUMENTATION INSPECTION REPORT, WASTE WATER TREATMENT PLANT OPERATION REPORT AND PLAN SAFETY BRIEFING AND STAFF DEVELOPMENT PROGRAM.

A Waste Water Assistant Manager will be able to:

1. Analyse mechanical inspection report;
2. Plan mechanical inspection work;
3. Plan biological inspection report;
4. Plan instrumentation inspection report;
5. Plan waste water treatment plant operation report;
6. Analyse safety briefing;
7. Plan work progress;
8. Plan job schedule;
9. Adhere to safety and security procedure.

WATER AND WASTE MANAGEMENT
LEVEL 5
WASTE WATER MANAGER

A WASTE WATER MANAGER IS DESIGNATED TO VERIFY MECHANICAL INSPECTION REPORT, VALIDATE MECHANICAL INSPECTION WORK, BIOLOGICAL INSPECTION REPORT, INSTRUMENTATION INSPECTION REPORT, WASTE WATER TREATMENT PLANT OPERATION REPORT AND EVALUATE SAFETY BRIEFING AND STAFF DEVELOPMENT PROGRAM.

A Waste Water Manager will be able to:

1. Verify mechanical inspection report;
2. Validate mechanical inspection work;
3. Validate biological inspection report;
4. Validate instrumentation inspection report;
5. Validate waste water treatment plant operation report;
6. Evaluate safety briefing;
7. Evaluate work progress;
8. Verify job schedule;
9. Evaluate staff development program; and
10. Adhere to safety and security procedure.

SECTOR: TRANSPORTATION

TRANSPORTATION
LEVEL 4
GREEN TECHNOLOGY INFRASTRUCTURE ASSISTANT FACILITATOR

A GREEN TECHNOLOGY INFRASTRUCTURE ASSISTANT FACILITATOR IS DESIGNATED TO PRODUCE INFRASTRUCTURE DRAWINGS, SPECIFICATION, MATERIAL AND SCHEDULE, ANALYSE INFRASTRUCTURE DATA SHEET AND MAINTAIN INFRASTRUCTURE EQUIPMENT.

A Green Technology Infrastructure Assistant Facilitator will be able to:

1. Produce infrastructure drawings;
2. Produce infrastructure specification;
3. Plan infrastructure materials;
4. Produce infrastructure procedure;
5. Produce infrastructure schedule;
6. Analyse infrastructure data sheet;
7. Conduct infrastructure testing;
8. Maintain infrastructure equipment;
9. Implement infrastructure regulations;
10. Liaise with accredited regulated body; and
11. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 5
GREEN TECHNOLOGY INFRASTRUCTURE FACILITATOR

A GREEN TECHNOLOGY INFRASTRUCTURE FACILITATOR IS DESIGNATED TO VERIFY INFRASTRUCTURE DRAWINGS, SPECIFICATION, MATERIALS AND SCHEDULE, EVALUATE INFRASTRUCTURE DATA SHEET AND VALIDATE INFRASTRUCTURE TESTING.

A Green Technology Infrastructure Facilitator will be able to:

1. Verify infrastructure drawings;
2. Verify infrastructure specification;
3. Evaluate infrastructure materials;
4. Verify infrastructure procedure;
5. Verify infrastructure schedule;
6. Evaluate infrastructure data sheet;
7. Validate infrastructure testing;
8. Evaluate infrastructure equipment;
9. Evaluate infrastructure regulations;
10. Liaise with accredited regulated body; and
11. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 4
GREEN TECHNOLOGY VEHICLE ASSISTANT DESIGNER

A GREEN TECHNOLOGY VEHICLE ASSISTANT DESIGNER IS DESIGNATED TO PRODUCE VEHICLE DESIGN, RETROFIT / NEW VEHICLE TESTINGS AND VEHICLE DESIGN PROTOTYPE, CARRY OUT RETROFIT / NEW VEHICLE PROCUREMENT, EXECUTE RETROFIT / NEW VEHICLE TESTING AND APPLY VEHICLE DESIGN TECHNOLOGY.

A Green Technology Vehicle Assistant Designer will be able to:

1. Produce vehicle design;
2. Carry out retrofit / new vehicle procurement;
3. Produce retrofit / new vehicle specification;
4. Execute retrofit / new vehicle testing;
5. Produce retrofit / new vehicle drawings;
6. Produce vehicle design prototype;
7. Apply vehicle design technology; and
8. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 5
GREEN TECHNOLOGY VEHICLE DESIGNER

A GREEN TECHNOLOGY VEHICLE DESIGNER IS DESIGNATED TO EVALUATE VEHICLE DESIGN AND RETROFIT / NEW VEHICLE DRAWINGS, VALIDATE RETROFIT / NEW VEHICLE PROCUREMENT, VERIFY RETROFIT / NEW VEHICLE SPECIFICATION AND TESTING AND ANALYSE VEHICLE DESIGN TECHNOLOGY.

A Green Technology Vehicle Designer will be able to:

1. Evaluate vehicle design;
2. Validate retrofit / new vehicle procurement;
3. Verify retrofit / new vehicle specification;
4. Verify retrofit / new vehicle testing;
5. Evaluate retrofit / new vehicle drawings;
6. Verify vehicle design prototype;
7. Analyse vehicle design technology; and
8. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 2
ELECTRIC CAR MAINTENANCE ASSISTANT MECHANIC

AN ELECTRIC CAR MAINTENANCE ASSISTANT MECHANIC IS DESIGNATED TO ASSIST IN ELECTRIC CAR MAINTENANCE DRAWING, ELECTRIC CAR MAINTENANCE TRAIN FOREMAN AND TESTING, CARRY OUT ELECTRIC CAR MAINTENANCE WORKSHOP, MANPOWER AND ELECTRIC CAR MAINTENANCE RECORD AND MAINTAIN VEHICLE MAINTENANCE EQUIPMENT.

An Electric Car Maintenance Assistant Mechanic will be able to:

1. Assist in electric car maintenance drawing;
2. Carry out electric car maintenance workshop;
3. Carry out electric car maintenance manpower;
4. Assist electric car maintenance train foreman;
5. Maintain electric car maintenance equipment;
6. Interpret electric car maintenance procedure;
7. Assist in electric car maintenance testing;
8. Carry out electric car maintenance record;
9. Execute electric car maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 3
ELECTRIC CAR MAINTENANCE MECHANIC

AN ELECTRIC CAR MAINTENANCE MECHANIC IS DESIGNATED TO MONITOR IN ELECTRIC CAR MAINTENANCE DRAWING, EQUIPMENT AND WORKSHOP, SUPERVISE ELECTRIC CAR MAINTENANCE TRAIN FOREMAN AND MANPOWER, CARRY OUT ELECTRIC CAR MAINTENANCE TESTING AND PROCEDURES.

An Electric Car Maintenance Mechanic will be able to:

1. Monitor in electric car maintenance drawing;
2. Monitor electric car maintenance workshop;
3. Supervise electric car maintenance manpower;
4. Supervise electric car maintenance train foreman;
5. Monitor electric car maintenance equipment;
6. Carry out electric car maintenance procedure;
7. Carry out electric car maintenance testing;
8. Monitor electric car maintenance record;
9. Monitor electric car maintenance spare part;
10. Adhere to safety and security procedure; and
11. Carry out supervisory functions.

TRANSPORTATION
LEVEL 4
ELECTRIC CAR MAINTENANCE ASSISTANT MANAGER

AN ELECTRIC CAR MAINTENANCE ASSISTANT MANAGER IS DESIGNATED TO ANALYSE ELECTRIC CAR MAINTENANCE DRAWING, PLAN ELECTRIC CAR MAINTENANCE TRAIN FOREMAN, MANPOWER AND WORKSHOP, ANALYSE ELECTRIC CAR MAINTENANCE EQUIPMENT AND TESTING.

An Electric Car Maintenance Assistant Manager will be able to:

1. Analyse electric car maintenance drawing;
2. Plan electric car maintenance workshop;
3. Plan electric car maintenance manpower;
4. Plan electric car maintenance train foreman;
5. Analyse electric car maintenance equipment;
6. Analyse electric car maintenance procedure;
7. Analyse electric car maintenance testing;
8. Plan electric car maintenance record;
9. Plan electric car maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 5
ELECTRIC CAR MAINTENANCE MANAGER

AN ELECTRIC CAR MAINTENANCE MANAGER IS DESIGNATED TO VERIFY ELECTRIC CAR MAINTENANCE DRAWING, VERIFY ELECTRIC CAR MAINTENANCE TRAIN FOREMAN AND EVALUATE ELECTRIC CAR MAINTENANCE TESTING, VALIDATE ELECTRIC CAR MAINTENANCE WORKSHOP, RECORD AND ELECTRIC CAR MAINTENANCE SPARE PART.

An Electric Car Maintenance Manager will be able to:

1. Verify electric car maintenance drawing;
2. Validate electric car maintenance workshop;
3. Evaluate electric car maintenance manpower;
4. Verify electric car maintenance train foreman;
5. Verify electric car maintenance equipment;
6. Evaluate electric car maintenance procedure;
7. Evaluate electric car maintenance testing;
8. Validate electric car maintenance record;
9. Validate electric car maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 2
NATURAL GAS VEHICLE MAINTENANCE ASSISTANT MECHANIC

A NATURAL GAS VEHICLE MAINTENANCE ASSISTANT MECHANIC IS DESIGNATED TO ASSIST IN NATURAL GAS VEHICLE MAINTENANCE DRAWING, TRAIN FOREMAN AND TESTING, CARRY OUT NATURAL GAS VEHICLE MAINTENANCE WORKSHOP, NATURAL GAS VEHICLE MAINTENANCE MANPOWER AND NATURAL GAS VEHICLE MAINTENANCE RECORD.

A Natural Gas Vehicle Maintenance Assistant Mechanic will be able to:

1. Assist in natural gas vehicle maintenance drawing;
2. Carry out natural gas vehicle maintenance workshop;
3. Carry out natural gas vehicle maintenance manpower;
4. Assist in natural gas vehicle maintenance train foreman;
5. Maintain natural gas vehicle maintenance equipment;
6. Interpret natural gas vehicle maintenance procedure;
7. Assist in natural gas vehicle maintenance testing;
8. Carry out natural gas vehicle maintenance record;
9. Execute natural gas vehicle maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 3
NATURAL GAS VEHICLE MAINTENANCE MECHANIC

A NATURAL GAS VEHICLE MAINTENANCE MECHANIC IS DESIGNATED TO MONITOR IN NATURAL GAS VEHICLE MAINTENANCE DRAWING, NATURAL GAS VEHICLE MAINTENANCE WORKSHOP AND NATURAL GAS VEHICLE MAINTENANCE EQUIPMENT, CARRY OUT NATURAL GAS VEHICLE MAINTENANCE SPARE PART SUPERVISE NATURAL GAS VEHICLE MAINTENANCE MANPOWER AND TRAIN FOREMAN.

A Natural Gas Vehicle Maintenance Mechanic will be able to:

1. Monitor in natural gas vehicle maintenance drawing;
2. Monitor natural gas vehicle maintenance workshop;
3. Supervise natural gas vehicle maintenance manpower;
4. Supervise natural gas vehicle maintenance train foreman;
5. Monitor natural gas vehicle maintenance equipment;
6. Carry out natural gas vehicle maintenance procedure;
7. Carry out natural gas vehicle maintenance testing;
8. Monitor natural gas vehicle maintenance record;
9. Monitor natural gas vehicle maintenance spare part;
10. Adhere to safety and security procedure; and
11. Carry out supervisory functions.

TRANSPORTATION
LEVEL 4
NATURAL GAS VEHICLE MAINTENANCE ASSISTANT MANAGER

A NATURAL GAS VEHICLE MAINTENANCE ASSISTANT MANAGER IS DESIGNATED TO ANALYSE NATURAL GAS VEHICLE MAINTENANCE DRAWING, PLAN NATURAL GAS VEHICLE MAINTENANCE TRAIN FOREMAN AND ANALYSE NATURAL GAS VEHICLE MAINTENANCE TESTING, NATURAL GAS VEHICLE MAINTENANCE EQUIPMENT AND PLAN NATURAL GAS VEHICLE MAINTENANCE RECORD AND SPARE PART.

A Natural Gas Vehicle Maintenance Assistant Manager will be able to:

1. Analyse natural gas vehicle maintenance drawing;
2. Plan natural gas vehicle maintenance workshop;
3. Plan natural gas vehicle maintenance manpower;
4. Plan natural gas vehicle maintenance train foreman;
5. Analyse natural gas vehicle maintenance equipment;
6. Analyse natural gas vehicle maintenance procedure;
7. Analyse natural gas vehicle maintenance testing;
8. Plan natural gas vehicle maintenance record;
9. Plan natural gas vehicle maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 5
NATURAL GAS VEHICLE MAINTENANCE MANAGER

A NATURAL GAS VEHICLE MAINTENANCE MANAGER IS DESIGNATED TO VERIFY NATURAL GAS VEHICLE MAINTENANCE DRAWING, VERIFY NATURAL GAS VEHICLE MAINTENANCE TRAIN FOREMAN AND EQUIPMENT, VALIDATE NATURAL GAS VEHICLE MAINTENANCE RECORD AND EVALUATE NATURAL GAS VEHICLE MAINTENANCE MANPOWER AND TESTING.

A Natural Gas Vehicle Maintenance Manager will be able to:

1. Verify natural gas vehicle maintenance drawing;
2. Validate natural gas vehicle maintenance workshop;
3. Evaluate natural gas vehicle maintenance manpower;
4. Verify natural gas vehicle maintenance train foreman;
5. Verify natural gas vehicle maintenance equipment;
6. Evaluate natural gas vehicle maintenance procedure;
7. Evaluate natural gas vehicle maintenance testing;
8. Validate natural gas vehicle maintenance record;
9. Validate natural gas vehicle maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 2
FUEL CELL VEHICLE MAINTENANCE ASSISTANT MECHANIC

A FUEL CELL VEHICLE MAINTENANCE ASSISTANT MECHANIC IS DESIGNATED TO ASSIST IN FUEL CELL VEHICLE MAINTENANCE DRAWING, FUEL CELL VEHICLE MAINTENANCE TRAIN FOREMAN AND VEHICLE MAINTENANCE TESTING, CARRY OUT FUEL CELL VEHICLE MAINTENANCE WORKSHOP, FUEL CELL VEHICLE MAINTENANCE RECORD AND MAINTAIN FUEL CELL VEHICLE MAINTENANCE EQUIPMENT.

A Fuel Cell Vehicle Maintenance Assistant Mechanic will be able to:

1. Assist in fuel cell vehicle maintenance drawing;
2. Carry out fuel cell vehicle maintenance workshop;
3. Carry out fuel cell vehicle maintenance manpower;
4. Assist in fuel cell vehicle maintenance train foreman;
5. Maintain fuel cell vehicle maintenance equipment;
6. Interpret fuel cell vehicle maintenance procedure;
7. Assist in fuel cell vehicle maintenance testing;
8. Carry out fuel cell vehicle maintenance record;
9. Execute fuel cell vehicle maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 3
FUEL CELL VEHICLE MAINTENANCE MECHANIC

A FUEL CELL VEHICLE MAINTENANCE MECHANIC IS DESIGNATED TO MONITOR IN FUEL CELL VEHICLE MAINTENANCE DRAWING, SUPERVISE FUEL CELL VEHICLE MAINTENANCE TRAIN FOREMAN, CARRY OUT FUEL CELL VEHICLE MAINTENANCE TESTING, MONITOR FUEL CELL VEHICLE MAINTENANCE RECORD AND FUEL CELL VEHICLE MAINTENANCE EQUIPMENT.

A Fuel Cell Vehicle Maintenance Mechanic will be able to:

1. Monitor in fuel cell vehicle maintenance drawing;
2. Monitor fuel cell vehicle maintenance workshop;
3. Supervise fuel cell vehicle maintenance manpower;
4. Supervise fuel cell vehicle maintenance train foreman;
5. Monitor fuel cell vehicle maintenance equipment;
6. Carry out fuel cell vehicle maintenance procedure;
7. Carry out fuel cell vehicle maintenance testing;
8. Monitor fuel cell vehicle maintenance record;
9. Monitor fuel cell vehicle maintenance spare part;
10. Adhere to safety and security procedure; and
11. Carry out supervisory functions.

TRANSPORTATION
LEVEL 4
FUEL CELL VEHICLE MAINTENANCE ASSISTANT MANAGER

A FUEL CELL VEHICLE MAINTENANCE ASSISTANT MANAGER IS DESIGNATED TO ANALYSE FUEL CELL VEHICLE MAINTENANCE DRAWING, PLAN FUEL CELL VEHICLE MAINTENANCE TRAIN FOREMAN, WORKSHOP AND MANPOWER, ANALYSE FUEL CELL VEHICLE MAINTENANCE EQUIPMENT AND TESTING.

A Fuel Cell Vehicle Maintenance Assistant Manager will be able to:

1. Analyse fuel cell vehicle maintenance drawing;
2. Plan fuel cell vehicle maintenance workshop;
3. Plan fuel cell vehicle maintenance manpower;
4. Plan fuel cell vehicle maintenance train foreman;
5. Analyse fuel cell vehicle maintenance equipment;
6. Analyse fuel cell vehicle maintenance procedure;
7. Analyse fuel cell vehicle maintenance testing;
8. Plan fuel cell vehicle maintenance record;
9. Plan fuel cell vehicle maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 5
FUEL CELL VEHICLE MAINTENANCE MANAGER

A FUEL CELL VEHICLE MAINTENANCE MANAGER IS DESIGNATED TO VERIFY FUEL CELL VEHICLE MAINTENANCE DRAWING, VERIFY FUEL CELL VEHICLE MAINTENANCE TRAIN FOREMAN AND EVALUATE FUEL CELL VEHICLE MAINTENANCE TESTING, SPARE PART AND FUEL CELL VEHICLE MAINTENANCE RECORD AND VERIFY FUEL CELL VEHICLE MAINTENANCE EQUIPMENT.

A Fuel Cell Vehicle Maintenance Manager will be able to:

1. Verify fuel cell vehicle maintenance drawing;
2. Validate fuel cell vehicle maintenance workshop;
3. Evaluate fuel cell vehicle maintenance manpower;
4. Verify fuel cell vehicle maintenance train foreman;
5. Verify fuel cell vehicle maintenance equipment;
6. Evaluate fuel cell vehicle maintenance procedure;
7. Evaluate fuel cell vehicle maintenance testing;
8. Validate fuel cell vehicle maintenance record;
9. Validate fuel cell vehicle maintenance spare part; and
10. Adhere to safety and security procedure.

TRANSPORTATION
LEVEL 4
GREEN TECHNOLOGY FUEL RESEARCH ASSISTANT TECHNOLOGIST

A GREEN TECHNOLOGY FUEL RESEARCH ASSISTANT TECHNOLOGIST IS DESIGNATED TO CARRY OUT FUEL RESEARCH LAB, FUEL RESEARCH SAFE KEEPING AND FUEL RESEARCH PROCUREMENT, EXECUTE FUEL RESEARCHER, PRODUCE FUEL RESEARCH PROPOSAL, PLAN FUEL RESERCH DATA AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Green Technology Fuel Research Assistant Technologist will be able to:

1. Carry out fuel research lab;
2. Execute fuel researcher;
3. Produce fuel research proposal;
4. Plan fuel research data;
5. Carry out fuel research safe keeping;
6. Adhere to safety and security procedure; and
7. Carry out fuel research procurement .

TRANSPORTATION
LEVEL 5
GREEN TECHNOLOGY FUEL RESEARCH TECHNOLOGIST

A GREEN TECHNOLOGY FUEL RESEARCH TECHNOLOGIST IS DESIGNATED TO VERIFY OUT FUEL RESEARCH LAB, FUEL RESEARCH SAFE KEEPING AND FUEL RESEARCH PROCUREMENT, VALIDATE FUEL RESEARCHER, EVALUATE FUEL RESEARCH PROPOSAL AND FUEL RESERCH DATA AND ADHERE TO SAFETY AND SECURITY PROCEDURE.

A Green Technology Fuel Research Technologist will be able to:

1. Verify fuel research lab;
2. Validate fuel researcher;
3. Evaluate fuel research proposal;
4. Evaluate fuel research data;
5. Verify fuel research safe keeping;
6. Adhere to safety and security procedure; and
7. Verify fuel research procurement.

TRANSPORTATION
LEVEL 2
*GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT TECHNICIAN

A GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT TECHNICIAN IS DESIGNATED TO CARRY OUT FUEL PRODUCTION, FUEL PRODUCTION FACILITIES AND FUEL PRODUCTION STORAGE, EXECUTE FUEL PRODUCTION MATERIALS AND INTERPRET FUEL PRODUCTION QUALITY CONTROL AND FUEL PRODUCTION QUALITY ASSURANCE.

A Green Technology Fuel Production Assistant Technician will be able to:

1. Carry out fuel production;
2. Carry out fuel production facilities;
3. Execute fuel production materials;
4. Carry out fuel production storage;
5. Interpret fuel production quality control;
6. Interpret fuel production quality assurance; and
7. Carry out fuel production delivery.

Note:
*Critical Job Title

TRANSPORTATION
LEVEL 3
*GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT TECHNICIAN

A GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT TECHNICIAN IS DESIGNATED TO SUPERVISE FUEL PRODUCTION, FUEL PRODUCTION FACILITIES FUEL PRODUCTION STORAGE AND FUEL PRODUCTION DELIVERY, MONITOR FUEL PRODUCTION MATERIALS, FUEL PRODUCTION QUALITY CONTROL AND FUEL PRODUCTION QUALITY ASSURANCE.

A Green Technology Fuel Production Assistant Technician will be able to:

1. Supervise fuel production;
2. Supervise fuel production facilities;
3. Monitor fuel production materials;
4. Supervise fuel production storage;
5. Monitor fuel production quality control;
6. Monitor fuel production quality assurance;
7. Supervise fuel production delivery; and
8. Carry out supervisory functions.

Note:
*Critical Job Title

TRANSPORTATION
LEVEL 4
*GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT MANAGER

A GREEN TECHNOLOGY FUEL PRODUCTION ASSISTANT MANAGER IS DESIGNATED TO PLAN FUEL PRODUCTION, FUEL PRODUCTION FACILITIES, FUEL PRODUCTION DELIVERY AND FUEL PRODUCTION STORAGE, ANALYSE FUEL PRODUCTION MATERIALS, FUEL PRODUCTION QUALITY CONTROL AND FUEL PRODUCTION QUALITY ASSURANCE.

A Green Technology Fuel Production Assistant Manager will be able to:

1. Plan fuel production;
2. Plan fuel production facilities;
3. Analyse fuel production materials;
4. Plan fuel production storage;
5. Analyse fuel production quality control;
6. Analyse fuel production quality assurance; and
7. Plan fuel production delivery.

Note:
*Critical Job Title

TRANSPORTATION
LEVEL 5
*GREEN TECHNOLOGY FUEL PRODUCTION MANAGER

A GREEN TECHNOLOGY FUEL PRODUCTION MANAGER IS DESIGNATED TO VERIFY FUEL PRODUCTION, FUEL PRODUCTION FACILITIES, FUEL PRODUCTION DELIVERY AND FUEL PRODUCTION STORAGE, VALIDATE FUEL PRODUCTION MATERIALS, FUEL PRODUCTION QUALITY CONTROL AND FUEL PRODUCTION QUALITY ASSURANCE.

A Green Technology Fuel Production Manager will be able to:

1. Verify fuel production;
2. Verify fuel production facilities;
3. Validate fuel production materials;
4. Verify fuel production storage;
5. Validate fuel production quality control;
6. Validate fuel production quality assurance; and
7. Verify fuel production delivery.

Note:
*Critical Job Title

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Jabatan Pembangunan Kemahiran Wilayah Sarawak,
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