Solar PV System Installation and Maintenance

Level-IV

Learning Guide-31

Unit of Competence	**Implement and Monitor Energy Sector Environmental and Sustainable Policies and Procedures**
Module Title	**Implementing and Monitoring Energy Sector Environmental and Sustainable Policies and Procedures**
LG Code	**EIS PIM4 M09 LO1- LG-31**
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LO1-Prepare/plan to implement and monitor environmentally sustainable practice management policies and procedures

ADRA ETHIOPIA

Instruction Sheet	Learning Guide:31

This learning guide is developed to provide you the necessary information, knowledge, skills and attitude regarding the following content coverage and topics:

- Obtaining and analysing works schedule(s)
- Prioritizing and sequencing work for efficient and effective outcome
- Identifying and giving relevant requirements (including environmental regulations)
- Identifying hazards and prioritizing OHS risks assessment and control measures
- Identifying, scheduling, coordinating and confirming resources
- Identifying risk management and minimizing energy wastage
- Sourcing items for installation

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:-

- Obtain and analyse works schedule(s)
- Prioritize and sequence work for efficient and effective outcome
- Identify and give relevant requirements (including environmental regulations)
- Identify hazards and prioritizing OHS risks assessment and control measures
- Identify, schedule, coordinate and confirm resources
- Identify risk management and minimizing energy wastage
- Source items for installation

Information Sheet-1	Obtaining and analysing works schedule(s)

1.1. Introduction

Schedule analysis is a needed action to identify facts, anomalies, and issues that can exist through the project duration due to intentional or unintentional actions. It is used to verify compliance with the client's contract specification, logical sequence between activities and overall schedule coherence. The traditional approach to developing a schedule has the contractor/preferred bidder create it on their own; an analysis is usually implemented once the contractor has submitted the schedule to the client. This cumbersome process can start a back-and-forth due to separations of service, wasting valuable time and money from the outset. Creating a comprehensive schedule is one of the more difficult activities that project managers face. Schedule creation is often considered more art than science, and results often support this. What is often more frustrating is that team members often find themselves on one team with a project manager that creates and manages schedules a particular way and on another team with a project manager with a different approach. We often hear from people on teams, "why can't all project managers do things the same way?"

If you have heard this on your team, perhaps it is time that you take a look at the way you and your team create your team schedules. Perhaps you are not taking a consistent step in developing team schedules that have been shown to work time and time again.
There are tons and tons of resources out there that claim the perfect answer to our scheduling problems by following the six simple steps below.

- **Step 1: Define the Schedule Activities**

Take your Work Breakdown Structure (WBS) work packages and decompose them further into schedule activities. Take each WBS work package, and decide what activities are required to create that package. For example, if your work package is "configure new computer hardware," your schedule activities might include "set up network configuration," "install the video card," "install applications," and then "set up mail client."

- **Step 2: Sequence the Activities**

Remember back in grade school where you were given a bunch of pictures and you had to figure out their order. You had to decide which picture represented the 1st activity, the 2nd activity and so on? Well, that is exactly what the second step is all about. In the second step we sequence the schedule activities by simply placing them in the order in which they need to happen. For example, perhaps we need to install the video card first, then set up the network configuration, install applications and then finally set up the mail client. In some cases two or more activities can be done simultaneously. Perhaps we can set up the mail client while other applications are being installed. This step is where we look at the different types of schedule dependencies such as finish-to-start, start-to-start, finish-to-finish, and start-to-finish to figure out how each of these activities relate to each other.

- **Step 3: Estimate the Resources Needed for the Activity**

The third step involves estimating what resources will be required to accomplish each activity. This includes estimating needed team resources, financial resources, and equipment. These resource needs should be selected for each activity prior to estimating the duration of each activity which is the next step.

- **Step 4: Estimating the Duration of Each of the Activities**

This step requires you and your team to analyse how long it will take to accomplish each of the activities. These estimates can be quantified through the following tools:

- ✓ **Expert Judgement**: by conferring with someone who is familiar or experienced in what it takes to accomplish a particular activity.
- ✓ **Analogous Estimating**: a top-down estimation approach is taken by looking at similar projects within your organisation for estimates on how long a particular activity should take.
- ✓ **Parametric Estimating**: basically this is scaling an estimate. For example, perhaps you know it takes on average 10 minutes to install a software application. If the "install applications" activity includes the installation of 6 applications, you can use parametric estimation to estimate that it will take approximately 6 times 10 minutes, or 60 minutes to install all the applications.

- ✓ **Three point estimation**: sometimes referred to as PERT analysis, is a great tool for estimating activity durations. You basically take a weighted average of a pessimistic, expected, and optimistic estimate for the activity duration. This estimate is in the form of (Pessimistic + 4x (Expected) + Optimistic) / 6

- **Step 5: Schedule Development**

This step is the process where the sequence of activities, resources needed for the activities, and the duration of each activity is used to optimise the overall project schedule. Tools used in this process include critical path method, schedule compression, what-if scenario analysis, resource levelling, and critical chain methods. Each of these topics could have one or more articles dedicated to it, so we will not go into the detail of each. Once the schedule is developed, it should be base lined to provide a snapshot of the original schedule plan of the plan.

- **Step 6: Monitoring and Controlling the Schedule**

The final step is monitoring and controlling the schedule. This step is performed throughout the life of the project and ensures that the work results lines up with the schedule plan. Schedule control requires the use of progress reporting, schedule change control systems, such as the use of project change requests, performance management, and variance analysis to determine if additional action is required to get the schedule back in line with the plan.

Self-Check -1	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Expert Judgement is a needed action to identify facts, anomalies, and issues that can exist through the project duration due to intentional or unintentional actions.
2	Creating a comprehensive schedule is one of the more difficult activities that project managers face.

Note: the satisfactory rating is as followed

Satisfactory	2 points
Unsatisfactory	Below2 points

Information Sheet-2	Prioritizing and sequencing work for efficient and effective outcome

2.1 Introduction

The need for project prioritization appears when an organization has two or more either independent or dependent (portfolio) projects that are performed in parallel. In order to ensure the achievement of strategic goals and objectives, that organization needs to focus on right projects among the variety. Knowing how to prioritize work affects the success of your project, the engagement of your team, and your role as a leader. All projects—especially large, complex projects—need clear priorities. Easier said than done. You can count on technical projects, no matter how well-planned, to involve change orders, re-prioritization and the regular appearance of surprises. It's just the natural order of things.

One of the biggest challenges for project managers and leaders is accurately prioritizing the work that matters on a daily basis. Even if you have the best project management software on the planet, you're the one who enters information into the tool. And, you don't want to fall into the role of crying "top priority" for every other project that comes down the pike. Just as you have to be diligent and have the right kind of project insight to ensure that nobody's working on yesterday's priorities. It takes a lot of practice to get this right. To help you manage your team's workload and hit deadlines, here are 6 steps to prioritizing projects that have a lot of moving parts.

- **Collect a list of all your tasks.**
  - ✓ Pull together everything you could possibly consider getting done in a day. Don't worry about the order or the number of items upfront.

- **Identify urgent vs. important.**
  - ✓ The next step is to see if you have any tasks that need immediate attention. We're talking about work that, if not completed by the end of the day or in the next several hours, will have serious negative consequences (missed client deadline; missed

publication or release deadlines, etc.). Check to see if there are any high-priority dependencies that rely on you finishing up a piece of work now.

- **Assess value.**
  - ✓ Next, look at your important work and identify what carries the highest value to your business and organization. As a general practice, you want to recognize exactly which types of tasks have top priority over the others.
  - ✓ For example, focus on client projects before internal work; setting up the new CEO's computer before re-configuring the database; answering support tickets before writing training materials, and so on. Another way to assess value is to look at how many people are impacted by your work. In general, the more people involved or impacted, the higher the stakes.

- **Order tasks by estimated effort**
  - ✓ If you have tasks that seem to tie for priority standing, check their estimates, and start on whichever one you think will take the most effort to complete. Productivity experts suggest the tactic of starting the lengthier task first. But, if you feel like you can't focus on your meatier projects before you finish up the shorter task, then go with your gut and do that. It can be motivating to check a small task off the list before diving into deeper waters.

- **Be flexible and adaptable.**
  - ✓ Uncertainty and change are given. Know that your priorities will change, and often when you least expect them to. But—and here's the trick—you also want to stay focused on the tasks you're committed to completing.

- **Know when to cut.**
  - ✓ You probably can't get to everything on your list. After you prioritize your tasks and look at your estimates, cut the remaining tasks from your list, and focus on the priorities that you know you must and can complete for the day. Then take a deep breath, dive in and be ready for anything.

Self-Check -2	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	The need for project prioritization appears when an organization has two or more either independent or dependent (portfolio) projects that are performed in parallel, In order to ensure the achievement of strategic goals and objectives, that organization needs to focus on right projects among the variety.
2	Collect a list of all your tasks is One of the 6 steps to prioritizing projects that have a lot of moving parts.

Note: the satisfactory rating is as followed

Satisfactory	2 points
Unsatisfactory	Below2 points

Information Sheet-3	Identifying and giving relevant requirements (including environmental regulations)

3.1 Introduction

is a collective term encompassing aspects of the law that provide protection to the environment.

3.2 The Role of International and National Laws in the Protection of the Environment

A law is society‘s system for weighing different interests, goals, and values, and for making decisions when conflicting interests cannot be reconciled in other ways. It is based mainly on political decisions and guidelines in the form of legislation and on society‘s general values or ethical norms. So, a law is formed by the legal system itself, with its own norms and values. By the legal system it meant, institutions or arenas dominated by lawyers and legal methodology: legal doctrine and education, and legal practice within and outside the courts.14 The role of the law in protecting the environment is not fundamentally different in both international and national law. Accordingly,

First, it provides mechanisms and procedures for negotiating the necessary rules and standards, settling disputes, and supervising implementation and compliance with treaties and customary rules.

Second, it is concerned with regulating environmental problems, setting common standards and objectives for prevention or mitigation of harm, and providing a flexible rule-making process that allows for easy and regular amendment in the light of technological development and advances in scientific and other knowledge.

Third, reinstatement of or compensation for environmental damage is a more limited but still important function. It is more limited because only those who suffer damage can secure such redress and also because not all-environmental damage is necessarily capable of reinstatement or has an economically assessable value.

Finally, it benefits or keeps accountable individuals.

3.3 The Law Making Process of Environmental Law in Ethiopia

A very important point for assessing environmental law (both at regional and International level) is a clear understanding of the law making process from which it derives. Accordingly, for the national environmental law, there is national parliament which is endowed by the constitution of the country with the power to legislate laws which could be relevant to the environment. Considering the structure of the government of the country at hand there could also be Regional State Councils which are endowed with the same power. Depending on the case there could also be a possibility for courts to make laws. To this effect, this time, as a base for judicial activism, we do have indicative article under Proclamation No 454/2005 which stipulates: Interpretation of low by the Federal Supreme Court rendered by the cassation division with no less than five judges shall be binding on federal as well as regional courts at all levels. The cassation division may, however, render a different legal interpretation some other time. To exemplify the above mentioned fact let us cite a provision for discussion from the Constitution of the Federal Democratic Republic of Ethiopia. The constitution under Art. 51(5) stipulates that 27: It shall enact laws for the utilization and conservation of land and other natural resources, historical sites and objects. Art. 52 of the same constitution that talks about the Powers and Functions of States in Sub Article 2(d) also prescribes as follows: To administer Land and other natural resources in accordance with Federal laws

Self-Check -3	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	A law is society‘s system for weighing different interests, goals, and values, and for making decisions when conflicting interests cannot be reconciled in other ways.
2	An article is a collective term encompassing aspects of the law that provide protection to the environment.

Note: the satisfactory rating is as followed

Satisfactory	2 and Above 2 points
Unsatisfactory	Below2 points

Information Sheet-4	Identifying hazards and prioritizing OHS risks assessment and control measures

4.1 What are workplace hazards?

Simply put, workplace hazards are any aspect of work that cause health and safety risks and have the potential to harm. Some hazards are more likely to be present in some workplaces than others, and depending on the work that you do, there will be hazards that are more or less relevant to your business.

4.2 . What are the most common workplace hazards?

There are many types of workplace hazards, which tend to come under four main categories:

i. **physical hazards** – the most common workplace hazards, including vibration, noise and slips, trips and falls;
ii. **ergonomic hazards** – physical factors that harm the musculoskeletal system, such as repetitive movement, manual handling and poor body positioning;
iii. **chemical hazards** – any hazardous substance that can cause harm to your employees;
iv. **Biological hazards** – bacteria and viruses that can cause health effects, such as hepatitis, HIV/AIDS and Legionnaire's disease.

- **Common health risks**

Some of the most common health risks associated with workplace hazards include:

- ✓ breathing problems;
- ✓ skin irritation;
- ✓ damage to muscles, bones and joints;
- ✓ hearing damage;
- ✓ Reduced wellbeing.

- **How to prevent workplace hazards**

The best way to protect yourself and your employees from workplace hazards is to identify and manage them and take reasonable steps to prevent their potential to harm.

In order to control workplace hazards and eliminate or reduce the risk, you should take the following steps:

- ✓ identify the hazard by carrying out a workplace risk assessment;
- ✓ determine how employees might be at risk;
- ✓ evaluate the risks;
- ✓ record and review hazards at least annually, or earlier if something changes.

- **What is a risk assessment?**

Risk assessment is a term used to describe the overall process or method where you:

- ✓ Identify hazards and risk factors that have the potential to cause harm (hazard identification).
- ✓ Analyze and evaluate the risk associated with that hazard (risk analysis, and risk evaluation).
- ✓ Determine appropriate ways to eliminate the hazard, or control the risk when the hazard cannot be eliminated (risk control).

A risk assessment is a thorough look at your workplace to identify those things, situations, processes, etc. that may cause harm, particularly to people. After identification is made, you analyze and evaluate how likely and severe the risk is. When this determination is made, you can next, decide what measures should be in place to effectively eliminate or control the harm from happening. Risk assessment is the overall process of hazard identification, risk analysis, and risk evaluation. Risk Assessments should be done by a competent person or team of individuals who have a good working knowledge of the situation being studied. Include either on the team or as sources of information, the supervisors and workers who work with the process under review as these individuals are the most familiar with the operation.

In general, to do an assessment, you should:

- ✓ Identify hazards.
- ✓ Determine the likelihood of harm, such as an injury or illness occurring, and its severity.
  - ➢ Consider normal operational situations as well as non-standard events such as maintenance, shutdowns, power outages, emergencies, extreme weather, etc.

- Review all available health and safety information about the hazard such as Safety Data Sheet (SDS), manufacturers literature, information from reputable organizations, results of testing, workplace inspection reports, records of workplace incidents (accidents), including information about the type and frequency of the occurrence, illnesses, injuries, near misses, etc.
- Understand the minimum legislated requirements for your jurisdiction.

✓ Identify actions necessary to eliminate the hazard, or control the risk using the hierarchy of risk control methods.

✓ Evaluate to confirm if the hazard has been eliminated or if the risk is appropriately controlled.

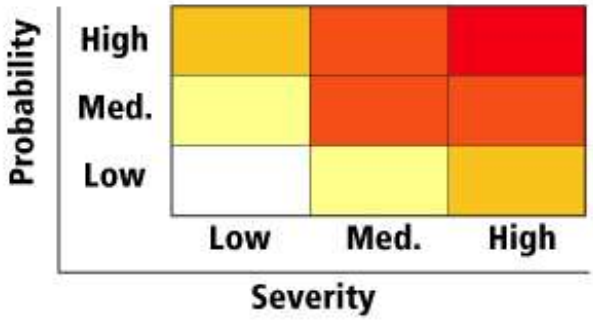
✓ Monitor to make sure the control continues to be effective.

✓ Keep any documents or records that may be necessary. Documentation may include detailing the process used to assess the risk, outlining any evaluations, or detailing how conclusions were made.

- **How are risks ranked or prioritized?**

Ranking or prioritizing hazards is one way to help determine which risk is the most serious and thus which to control first. Priority is usually established by taking into account the employee exposure and the potential for incident, injury or illness. By assigning a priority to the risks, you are creating a ranking or an action list. There is no one simple or single way to determine the level of risk. Nor will a single technique apply in all situations. The organization has to determine which technique will work best for each situation. Ranking hazards requires the knowledge of the workplace activities, urgency of situations, and most importantly, objective judgment. For simple or less complex situations, an assessment can literally be a discussion or brainstorming session based on knowledge and experience. In some cases, checklists or a probability matrix can be helpful. For more complex situations, a team of knowledgeable personnel who are familiar with the work is usually necessary. As an example, consider this simple risk matrix. Table 1 shows the relationship between probability and severity.

Table 1: Risk matrix



- **Risk assessment control measures**

Control measures are the things you put in place to reduce risk and prevent harm. In this blog post we look at the 5 best risk assessment control measures, and which order you should apply them with examples. A successful risk assessment must check existing controls, and what more should be done.

✓ **Elimination**

We have already discussed this earlier on in this post, and elimination should always be the first control measure you consider.

Examples of elimination:

- Use extendable tools to eliminate work at height
- Materials delivered cut to size to remove the use of blades
- Cordless equipment to get rid of trailing cables

✓ **Substitution**

Substitution is the second best control measure you could use.

Maybe the risk cannot be removed entirely, but could it be reduced by replacing the material, substance or process with something less dangerous?

Examples of substitution:

- Replacing ladders with tower scaffolds
- Substituting a hazardous chemical with a safer alternative

- Changing high-level vibrating equipment with newer equipment with less vibration exposure

✓ **Engineering** controls

Third on our list, are engineering controls. These are usually fixed temporary or permanent controls. Engineering controls could be collective (protecting all workers e.g. edge protection for work at height) or individual (protecting a single user e.g. anchor points for connecting via lanyard). Give priority to measures which protect collectively over individual measures.

Examples of engineering controls:

- Extraction machines to remove hazardous dust or fumes from the air
- Enclosing dangerous items of machinery or moving parts
- Installing guard rails to fall hazards

✓ **Administrative** controls

At number four, we have administrative controls. While this type of control is lower down on the list it will often be an essential part of your control measures.

These are rules and systems to carry out the work. What are the procedures you need to work safely?

Examples of administrative controls:

- Limiting use of vibrating equipment below exposure action values
- Banning work at height and lifting operations in bad weather
- Enforcing a one-way traffic system on site

✓ **Personal protective clothes and equipment**

Personal protective clothing and equipment (PPE) is the last line of defense against a hazard, so while it shouldn't be your first choice when controlling risks, it can give added protection for any remaining level of risk, or should other controls fail.

Examples of PPE:

- Use of ear defenders when using noisy equipment
- Harnesses and lanyards where the risk of falls cannot be eliminated completely
- Hard hats where there may be falls of tools or materials overhead

- **Selecting** the best controls for your risk assessment

You don't have to pick just one control for each risk from the top 5. If the risk cannot be eliminated completely, then often, the best way to control it will be through a combination of the other 4 control measures. For example, you may be able to replace a toxic chemical for one that is no longer toxic but is still dangerous. You might then need to implement engineering controls (secure storage area, fume extraction), administrative controls (training and job rotation to limit exposure) and PPE (gloves, RPE, goggles) for its use. Remember to make sure all the controls work well together, are detailed in your risk assessment, communicated to your team, and are regularly reviewed and maintained to make sure they remain effective. If chosen, PPE should be selected and fitted by the person who uses it. Workers must be trained in the function and limitation of each item of PPE.

Figure 1: The hierarchy of control measures

Self-Check -4	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Risk assessment is any aspect of work that cause health and safety risks and have the potential to harm.
2	Workplace hazard is the overall process of hazard identification, risk analysis, and risk evaluation.
3	Ranking or prioritizing hazards is one way to help determine which risk is the most serious and thus which to control first.

Note: the satisfactory rating is as followed

Satisfactory	2 and Above 2 points
Unsatisfactory	Below2 points

Information Sheet-5	Identifying hazards and prioritizing OHS risks assessment and control measures

5.1 Identifying resources

The right people are taking on the right work at the right time. But how do you know who are the right people? Any resource management process only works if you know who is needed to do the work. Here are 5 points to help you identify the right resources for your work.

- **Know what work is required**

Make sure that you have a clear brief before the work starts. You should understand what part of the bid was. You and the client should have a common understanding of what is included in the work. Confirm the scope with whoever needs to approve the work going ahead. This is the definitive list of everything that is expected on the work. Of course, that might change as work progresses, but your need to have a starting point from which to plan your work and the people who should be involved. When you know what the scope of the project is, you can start to look at the resources required.

- **Plan in advance**

It's better to plan your resource needs in advance. There is too much risk involved with waiting until you need a particular resource and then trying to book them. That person might be already fully committed on another project, or on vacation or so on.

- **Confirm resource availability**

Perhaps someone is available to your project 50% of the time. What does that actually mean? Is it 50% of the full week? Or 50% of their time after a percentage has been sliced off for their admin and non-billable time? Or some other calculation? Check how much you can expect from resources – especially those who are only contributing to the project in a part-time capacity – before you book their time into your schedule.

- **Check their skills**

Do the people you want on the project still have up-to-date skills in the appropriate areas? Check your organization's skills catalogue and make sure. It would be embarrassing to book a colleague on to a project and then find out that the last time he used those skills was on another project with you three years ago. Other people in the team might have got more relevant or updated skills, and they might be more appropriate for this client engagement.

✓ **Remember to book equipment**

We tend to focus on resources as being the human kind, but here are other types of resource that are important for projects. If you are working with a client in a consulting capacity, for example, you might not need any kit beyond your own personal computer. But if you are designing software for a client, you might need access to your company's test lab or test equipment to make sure it's fit for purpose before it goes to the client for user acceptance testing. Equipment is another kind of resource that you can book. Schedule what you need so that it is available for you when you need it. When you use these tips together, you can have confidence that you are securing the right resources for your project, using the right process and they will have the right skills to help you deliver fantastic outcomes for your clients.

- **Scheduling resources**

A Resource Plan identifies the physical resources required to complete a project. It lists each of the resource types (such as labour, equipment and materials) and how many of each you need. If you would like to define a comprehensive Resource Plan for your project, take the following three steps. First, identify the different types of resources needed to complete the project. You then need to quantify the amount of each type of resource required. And finally, you need to schedule the consumption of each resource within the project. Let's describe each step in a little more detail.

✓ **Step 1: List the resource required**

You should start by listing the resources required to complete the project.

- Labour. Identify all the roles involved in performing the project, including all full-time, part-time and contracting roles.

- Equipment. Identify all of the equipment involved in performing the project. For instance, this may include office equipment (e.g. PCs, photocopiers, and mobile phones), telecommunications equipment (e.g. cabling, switches) and machinery (e.g. heavy and light machinery).
- Materials. Identify all of the non-consumable materials to complete project activities such as materials required to build physical deliverables (e.g. wood, steel and concrete).
- Hardware/software. Identify if applicable.

✓ **Step 2: Estimate the number of resources required**

The next step is to estimate the number of each resource.

- Labour, estimate how many hours you need per role
- Equipment, estimate how many pieces of equipment needed
- Materials, estimate how much material, in terms such as square meters, kilograms, number of units, etc.

As much as possible, also indicate the date the resources are needed and the consumption rate per day, week or month.

✓ **Step 3: Construct a resource schedule**

You have now collated all the information required to build a detailed Resource Schedule. Create a resource schedule which specifies the:

- Resources required to complete the project
- Timeframes for the consumption of each resource
- Quantity of each resource required per week/month
- Total quantity of resource consumed per week/month
- Assumptions and constraints identified

- **Coordinating resources**

Every project requires the use of some type of resource. A resource is something you need to complete a task. When most people think about resources they think about money, but money is not the only resource. Sometimes a project will require human resources, like workers. Other

projects might require the resources of time or space. Larger projects may require many different kinds of resources. When planning and organizing projects in the workplace, it's important to figure out which resources are required, and coordinate or organize their use effectively.

When planning and organizing projects in the workplace, it's important to be able to figure out what resources are required and coordinate, or organize them in the best way. The size of the project will determine what type and how many resources will be required. Usually the larger the project, the more resources you will have to coordinate. Unless you have a process in place, coordinating many different types of resources can be stressful. Here are five steps to help you learn to coordinate resources:

- ✓ Figure out what you need
- ✓ Estimate the cost
- ✓ Create a budget
- ✓ Organize workers
- ✓ Pay the bills

- **Figure out what you need**

When coordinating resources, the best place to start is to figure out what you will need for the project. If this is your first time working on this type of project, this can be challenging. You could start by talking to other people who have worked on similar projects and finding out what resources they needed. As you start to think of ideas, keep track of them in a list. At this point, it's okay to write down more than what you will actually need. It's better to include unnecessary items and remove them from the list later than to leave out something important.

- **Estimate the cost**

Now that you have an idea of the type of resources you will need for your project, you can begin to figure out how much it will cost. It's important to estimate, or make an educated guess about the cost early in the planning process. This will help prevent surprise expenses later on.
To get started, you'll need to look back at the list of resources you created earlier. For each resource, figure out how much you think that resource will cost. If your employer doesn't have

pricing information for the resources you need you might have to do some research. Search the Internet to find pricing information. You may need to contact the vendor, or seller, of an item if you can't find pricing information on the Internet.

- **Create a budget**

Once you have an idea of what all of your resources will cost, you can begin to create a budget. A budget is a list of expenses for the project. Your employer will probably set a limit to the amount of money you can use to purchase resources. It's important to create a budget to show that your project won't cost more than the amount allowed by your employer. Figuring out your budget can be done by taking the number needed and multiplying by the price of the item for each resource. For example, if you need five solar panels to install for your client, and each panel costs 4,424.4 ETB, you would multiply 5 x 4,424.4 ETB, for a total cost of 22,122 ETB. Continue this process for each resource. Once you have the cost for each resource, add them all up for your total budget amount.

- **Organize workers**

Larger projects might be too much work for you to handle on your own. You may need to organize volunteers or fellow coworkers to help you complete the project. If you're organizing an event, you might need people to help you plan the event and volunteers to help work at the event. You also may need the help of others, not because there is too much work, but because the type of work is not something you know how to do. Refer back to your to-do list and figure out what you can do yourself and what you will need help with. Then, think about who you can ask to help with each task. When you ask people to help with your project, be very specific about what they will be doing. Include as many details as you can. It might be helpful to create a written description for each job with a list of all of the duties and responsibilities. You can then share this description with each person you ask to help.

- **Pay the bills**

Most service providers and vendors will send you an invoice, or bill, after they have finished their part of the job. Once the service has been completed or the product has been delivered, you will receive a bill, charging you for that product or service. Depending on the size of your

organization, there might be an employee or an entire department that takes care of paying the bills. If that is the case, simply deliver the bill to the person responsible within your organization. If you are required to take care of paying the bill, find out how to pay the bill and when the bill is due. Then, make sure that you submit the payment before the due date to avoid penalties or additional expense. Now that you've learned these five steps, you can make the most of the resources you have. Going forward, remember that the key to success is not the amount of resources you have; what matters is how you make use of them. Resource confirmation is the process of assigning and scheduling resources to project tasks. Resources are the life blood of tasks. Resources are used to carry out the project, and are returned to their owners if not consumed by the project.

There are 6 steps to performing a proper resource allocation:

i. Divide the Project into Tasks
ii. Assign the Resources
iii. Determine resource attributes
iv. Resource Levelling
v. Re-allocate as necessary
vi. Track resource utilization

- **Divide the Tasks into activities**

In task management, the task is divided into activities and managed on a task, rather than a project, level. Resource allocation is an integral component of this process because each task is assigned the necessary resources, and there sources are managed by activity. Once the task is successfully divided into activities, the resources can be assigned.

- **Assign the Resources**

Each task requires resources in order to be successfully performed. As a minimum, most tasks require a human resource to carry out some actions. Usually, the person starts with some input materials which are used to produce an output. Generally, there are **five** types of resources:

- ✓ Labour
- ✓ Equipment

- ✓ Materials
- ✓ Facilities
- ✓ Miscellaneous

- **Determine Resource Attributes**

Each resource comes with attributes (project manager lingo) which must be sufficient to carry out the project work. These attributes include:

- ✓ Grade
- ✓ Skill
- ✓ Quality
- ✓ Resource-specific attributes: Size, shape, length, speed, colour, strength, etc.
- ✓ Availability

- **Resource Levelling**

Resource levelling refers to the process of inspecting the resources to ensure their use is as “smooth” and level as possible. It is a common scenario that it is more advantageous to extend the project schedule to avoid large spikes and dips in resource usage. In addition, the resources used to carry out those tasks must be procured (purchased), delivered, and prepared. During the project, they must be maintained and serviced. All of these tasks must be accounted for within the project schedule and budget.

- **Re-allocate as Necessary**

Throughout the project, resource re-allocation tends to be a constant and inescapable function of the project manager. Resources are scarce. They sometimes do not show up on time, are needed by other projects, or lose their usefulness over time. Many things can happen that require a shift of resources from one task to another, or a change in the project schedule or budget.

- **Track Utilization Rates**

It is a surprisingly common occurrence that a resource arrives at site and sits idle for a long period of time. It is equally common that workers have no idea that the resource is being paid

for but not being used. A simple solution is to track resource utilization rates. The utilization rate is simply the percentage of billable time: Utilization Rate = Number of Billable Hours / Number of Total Hours. For example, if Bill worked 4 hours out of a possible 40 hours for the week, his utilization rate is 4 / 40 = 10%. Clearly this would suggest corrective action is warranted on the part of the worker.

Self-Check -5	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Resource levelling refers to the process of inspecting the resources to ensure their use is as “smooth” and level as possible.
2	Labour is the process of assigning and scheduling resources to project tasks.

Note: the satisfactory rating is as followed

Satisfactory	2 points
Unsatisfactory	Below2 points

Information Sheet-6	Identifying risk management and minimizing energy wastage

6.1. Introduction

Identifying risk management is elaborated in this learning guide above. Now we will see how to minimize energy wastage. Risk management is the process of identifying, assessing and controlling threats to an organization's capital and earnings. These threats, or risks, could stem from a wide variety of sources, including financial uncertainty, legal liabilities, strategic management errors, accidents and natural disasters. By implementing a risk management plan and considering the various potential risks or events before they occur, an organization can save money and protect their future. This is because a robust risk management plan will help a company establish procedures to avoid potential threats, minimize their impact should they occur and cope with the results. This ability to understand and control risk enables organizations to be more confident in their business decisions. Furthermore, strong corporate governance principles that focus specifically on risk management can help a company reach their goals.

6.2. Minimizing Energy Wastage

Energy waste means consumption of electricity, water and gas when that not performs any useful action. One of main reason of energy waste occurs is energy consumption devices are not managed and maintained properly. Energy wastage are grouped in three categories

- Long term energy waste – permanent problems
- Regular energy waste – daily event which is predictable
- Intermittent energy waste – irregular events

Nobody likes to be wasteful. When it comes to energy waste, sometimes knowing is half the battle. There are many opportunities available to conserve energy and reduce a utility bill that YOU can do today for little to no cost. We like to call this living a conservation "lifestyle".

- ✓ **Ways of Minimizing Energy Wastage**
  - ➢ **Set the thermostat to 68 degrees when home or awake and 55 degrees when sleeping or away.**

Heating is the largest consumer of electricity in electrically heated Mason County homes. Making thoughtful adjustments to thermostats will make a large impact on winter heating bills. For each degree a thermostat is turned down, a customer could see a 2% - 3% reduction in monthly heating bills. That's a significant improvement if there were no previous thermostat adjustments. Also, don't forget to turn down the thermostat and close the door in unused rooms. Furniture, curtains, or other household items blocking wall/baseboard heaters or register vents, could be blocking the heat they are trying to deliver. Rearrange furniture and curtains to take advantage of heat sources in the home. Vacuum the heater coils and clean registers often. Turn down the water heater temperature. An electric water heater can account for up to 25% of a home's energy bill.

- ➢ **Setting a residential water heater to 120°F**

To reduce energy usage and to help prevent scalding. Each 10°F reduction in water temperature can save 3% - 5% on an energy bill. Save energy and help make the home safer by reducing the thermostat setting on residential water heaters.

- ➢ **Wash clothes in cold water & clean the dryer lint screen.**

Washing clothes in cold water instead of hot water will save almost 90% of the energy needed to run a normal load of laundry. Cleaning the dryer lint screen before each load will help it to run more efficiently.

- ➢ **Run the dishwasher only when it's full.**

A dishwasher will use the same amount of water whether it's full or not. Save water and the energy needed to heat that water by running the dishwasher only when it's full. Also, consider using the dishwasher's "delay start" feature to reduce the demand on the home's hot water.

- **Adjust the temperature of the refrigerator and freezer.**

Refrigerators and freezers are running all the time. To ensure they are running efficiently, keep the refrigerator temperature at about 38°F and the freezer at about 0°F. Defrost the freezer when ice build-up is approximately 1/4" thick. Vacuum or brush the cooling coils (in back) at least every six months.

- **Take shorter showers.**

Reduce shower time. Shortening a shower by just a few minutes each day can really add up. A customer can save an average of 2.5 gallons of water per minute, not to mention the energy used to heat the water. Showers are a sneaky consumer of electricity because most people forget about the energy needed to heat the water for a warm shower. Install a low-flow showerhead on each shower at home.

- **Turn off the lights.**

Turn off the lights in rooms that are unoccupied.

- **Unplug electronics and chargers when not in use.**

Many TVs, DVD players, surround sound systems, and other consumer electronics have "Instant-On" features and small clocks. These features are consuming energy all the time. This can be very deceptive because the device looks like it's turned off. Unplug these devices from the wall. This will ensure they are not consuming energy while not in use.

- **Let the oven take a break.**

Small appliances such as microwaves, toaster ovens, and slow cookers use 50% - 80% less energy than an oven or range. If meal plans allow for it, using these devices will help reduce the energy bill. They will also help keep the home cooler in the summer.

- **Hang the laundry to dry.**

Solar and wind power were around long before we started using them to power out lights!
In the summer months, take advantage of the abundant solar energy and hang laundry out to dry. Hopefully they'll smell like a field of cut grass and fresh flowers!

- **Change the filters in your heating system.**

A home's heating system needs to breathe to run efficiently. Be sure to change the necessary filters regularly to keep the system up and running. Buying filters in multi-packs is a good way to ensure one is on hand when needed. Schedule an annual visit with an HVAC technician to service a home's heating system. This will help ensure equipment will last a long time and will be running efficiently throughout the heating season.

- **Install LED lights.**
  - LEDs are up to 90% more energy efficient than traditional incandescent bulbs and are more affordable than ever.
  - LOCATION: You can use LEDs in indoor and outdoor fixtures. They turn on instantly and are dimmable with most household dimmers.
  - LIFESPAN: Manufacturers claim LEDs can last up to 20 years with typical usage of 3 hours per day.
  - LIGHT QUALITY: LEDs come in daylight, warm, and cool colour temperatures to keep your home looking its best!
  - SELECTION: You can find an LED for almost any application these days, making every socket in your home an opportunity to reduce your PUD 3 bill.

    If you're just getting started, replace the lights that are on the longest with LEDs. Perhaps a hallway light that you leave on at night, an outdoor security light, or a kitchen light. Or, if you have young children who can't ever seem to remember to turn off their bedroom light when they leave, upgrade their room lights to LED to reduce the impact on your wallet while you teach them not to be wasteful!

- **Use dryer balls.**

Have you heard of "Dryer Balls"? They look like a dog's squeaky toy that you put in the dryer with your clothes. Manufacturers claim that they can save you money by reducing the amount of time your dryer will run when you add a dryer ball to your load of laundry. PUD 3 did a little experiment to make sure you aren't getting hung out to dry!

- **Weather strip and caulk doors and windows.**

Adding or repairing the weather stripping on doors and windows can significantly reduce heat loss and drafts. This is an excellent do-it-yourself project. Supplies can be purchased at most local home improvement stores.

- **Add a ceiling fan.**

Installing an ENERGY STAR ceiling fan is a good way to keep the air circulating in a home. Be sure to reverse the fan direction in the winter to pull the warm air off the ceiling and disperse it throughout the room. You'd be surprised what a big difference a fan can make. You might even become a fan… of your fan.

- **Repair leaking and dripping faucets.**

Repair leaking and dripping hot water faucet to keep the energy used to heat the water from going down the drain. If a home has a well pump, even a leaky cold water pipe and faucet can waste energy by causing the pump to continuously cycle on and off.

- **Install lighting controls: motion sensors, day/night photocells, and timers.**

Installing motion sensors and photocell day/night sensors on outdoor lights and timers on indoor lights ensures electricity is being used to keep lights on only when necessary. In some cases, this will reduce energy used by nearly 80%!

Self-Check -6	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Light Quality is the process of identifying, assessing and controlling threats to an organization's capital and earnings.
2	LEDs are up to 90% more energy efficient than traditional incandescent bulbs and are more affordable than ever.

Note: the satisfactory rating is as followed

Satisfactory	2 points
Unsatisfactory	Below2 points

Information Sheet-7	Sourcing items for installation

7.1 Introduction

If you're considering installing a solar panel system, you've probably spent some time researching financing, tax breaks, and solar installers. However, you should also educate yourself about the solar energy equipment your system needs to get up and running. While the components of a PV system are simple, the different product options and brands can make the equipment selection process fairly complex. We'll break down all things solar power equipment in order to best prepare you to select your solar hardware. In order to go solar, you're going to need the following equipment:

- Solar panels
- Inverter
- Racking
- Performance monitoring
- Storage option (battery or grid connection)

7.2 The Five Main Solar Energy Equipment Types and Technologies

- **Solar Panels**

The primary equipment decision you'll make is the brand and type of panels to choose for your PV system. For an easy guide to comparing and contrasting the top panel brands, check out our complete ranking of the best solar panels on the market. Some of the factors to consider at as you weigh your options are efficiency, cost, warranty and technology type. Solar panels will generally be categorized as one of two technologies: monocrystalline and polycrystalline. Both types have the same function and are made from silicon cells, but the outward appearance and price of each is significantly different. Monocrystalline panels are more efficient and more expensive, and come with a dark blue or black tint (major manufacturers are Sun Power and LG). Polycrystalline panels, the cheaper and less efficient option, are a lighter blue hue (major manufacturers are Solar World and Hanwha).

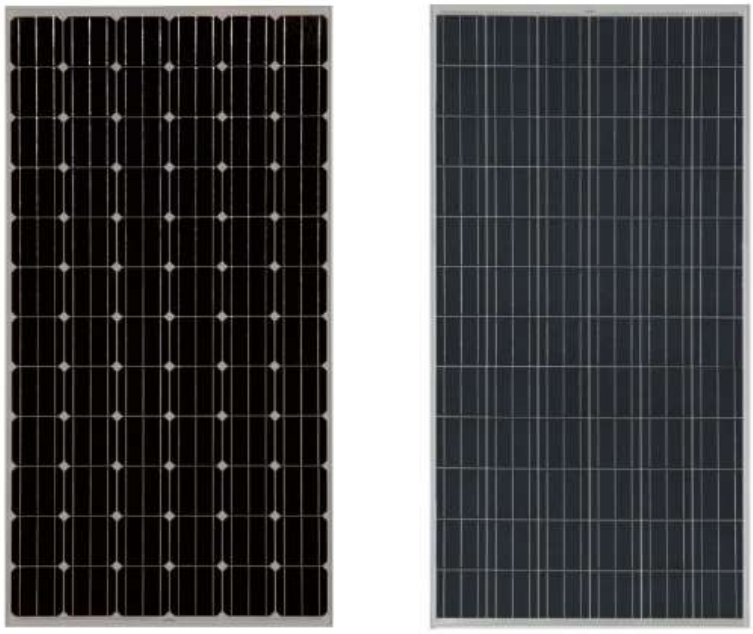


Figure 2: solar panels

- **Inverters**

Generating rooftop solar energy is a simple process in which solar panels convert sunlight into direct current (DC) power that can be delivered to a home's power system. However, most homes and businesses are wired to use alternating current (AC) power. That conversion from DC to AC is where inverters come into play, and there are several options to compare: String inverters: Also known as a centralized inverter, a string inverter refers to a single string technology that connects your solar array to the electrical panel of your home. String inverters are the least expensive inverter option you'll find, but they aren't ideal for every situation. They connect your panels to your home's power infrastructure as a single unit, which means that if one panel in your system isn't performing well due to a shading issue, your entire array's performance will fall until that single panel recovers.

Figure 3: Inverter

- ✓ Micro-inverters: Unlike string inverters, micro-inverters are attached individually to every solar panel, which maximizes production for your array. In the example given above, if a single panel is shaded or blocked by a cloud during the day, the rest of your solar system's production won't be affected because each panel has its own micro-inverter. Micro-inverters also offer panel-level performance monitoring in your array – a huge plus for homeowners interested in closely tracking the output of each individual solar panel. Though they are the most efficient equipment technology option, micro-inverters are also the most expensive one.

Figure 4: Micro inverters

- ✓ Power optimizers: With the definitions of micro-inverter and string inverter in mind, one can think of a power optimizer as a hybrid of the two. Like micro-inverters, power optimizers are installed at each panel. However, they are a more affordable option than micro-inverters, and slightly more expensive than a string inverter system. Power optimizers are ideal for higher maintenance roofs that involve shading issues or panels that need to face alternate directions. Like micro-inverters, power optimizers offer performance monitoring for each panel in your system. Power optimizers are not inverters – they "condition" the DC power from a solar panel and then pass it onto a centralized inverter where conversion occurs. While power optimizers can improve your system's efficiency, they don't offer the efficiency of a micro-inverter system.

Figure 5: power optimizer

- **Solar Panel Racking**

Homeowners are often surprised to learn that their solar panels are not nailed directly onto their roof but instead mounted onto racking equipment. Racking allows your solar installer to optimally angle solar panels for maximum performance and also helps to attach the array to your roof without causing damage. Solar panels will ideally face south at an angle of between 8 and 10 degrees. The term "racking" refers to a rooftop installation, but there is also mounting equipment that is ideal for ground mount solar and solar carports, which can both serve the same purpose of maximizing the angle of the panels for sunlight exposure. With ground mount solar, you can choose between fixed and track mounts. Fixed mounts are stationary, placed at

a set angle and orientation whereas track mounts are designed to adjust and “follow” the sun during the day as it moves across the sky.

Figure 6: solar panel Racking

- **Performance Monitoring and Tracking Systems**

One of the best reasons to go solar is the experience of watching your electric bills diminish over time. Having a good performance monitoring system is a key interest for solar homeowners. This nifty piece of solar energy equipment reports the hourly electricity production of your solar system. In addition to being a fun way to watch your panels power your home, monitoring systems allow you to recognize potential performance issues and ensure maximum electricity production. There are two forms of monitoring system: on-site monitors, where the system is installed with your panels, and remote monitors, where your system is tracked through the cloud and can be monitored online.

- **Solar Batteries**

Many homeowners interested in solar want to include some form of energy storage that will allow their solar panels to offer power during night time and disadvantageous weather. While many states offer net metering, which allows homeowners to use the electrical power grid as

backup storage for their solar array, adding a battery to your solar system can make more sense or may be your only storage option in some cases. Solar-plus-storage, also referred to as solar batteries, are typically offered as either lead acid or lithium ion technologies (such as the Tesla Power wall). Price and efficiency are the deciding factors between the two options – lithium ion is the current favourite with regard to popularity but is undoubtedly more expensive.

Figure 7: solar Battery

Self-Check -7	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Solar Panel is one the Five Main Solar Energy Equipment Types and Technologies.
2	Generating rooftop solar energy is a simple process in which solar panels convert sunlight into Alternative current (AC) power that can be delivered to a home's power system.

Note: the satisfactory rating is as followed

Satisfactory	2 points
Unsatisfactory	Below2 points

Solar PV System Installation and Maintenance

Level-IV

Learning Guide -32

Unit of Competence	**Implement and Monitor Energy Sector Environmental and Sustainable Policies and Procedures**
Module Title	**Implementing and Monitoring Energy Sector Environmental and Sustainable Policies and Procedures**
LG Code	**EIS PIM4 M0920 LO2- LG-32**
TTLM Code	**EIS PIM4TTLM 0920v1**

LO2: Carry out the implementation and monitoring of environmentally sustainable work management policies and Procedure.

Instruction Sheet	Learning Guide: 32

This learning guide is developed to provide you the necessary information, knowledge, skills and attitude regarding the following content coverage and topics:

- Implementing and monitoring environmentally sustainable work practices
- Carrying out environmentally sustainable energy management policies
- Applying essential knowledge and associated skills
- Identifying and taking action solutions to non-routine problems
- Undertaking on-going checks to quality of work

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:-

- Implement and monitor environmentally sustainable work practices
- Carry out environmentally sustainable energy management policies
- Apply essential knowledge and associated skills
- Identify and taking action solutions to non-routine problems
- Under takeon-going checks to quality of work

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks

Information Sheet- 1	Implementing and monitoring environmentally sustainable work practices

1.1 Implementing and monitoring environmentally sustainable work practices

Sustainable practices are the processes services employ to maintain the qualities that are valued in the physical environment. Living sustainably is about living within the means of natural systems (environment) and ensuring that our lifestyle doesn't harm other people (society and culture). In this respect, sustainable practices relate not only to the natural world but also to other important issues, such as poverty, consumption, community and health. Sustainable practices empower children to gain knowledge, understanding and appreciation of the environment as it relates to our society. It is through positive childhood experiences that the foundations are laid for the development of environmentally responsible adults.

1.2 What is environmental responsibility?

Environmental responsibility is one aspect of sustainability. It is about instilling in children ways to be creative, empowered and positive about the future they are creating through connections and understanding of the environment. A service that aims to teach environmental responsibility will provide children with the opportunity to learn from the environment. Through hands on experience, children will explore the environment and develop skills and knowledge and will develop the critical thinking skills to make informed decisions that affect not only the quality of life in the present but for future generations as well.

- **Some examples of sustainable activities are listed below:**
  - ✓ observing and caring for birds / animals / reptiles / insects
  - ✓ water conservation with timers or stickers visible on taps, rainwater tanks or children putting out buckets to collect rainwater
  - ✓ children being responsible for turning lights and fans off before going outdoors
  - ✓ children recycling paper and packaging for re-use in art and craft activities
  - ✓ children participating in sorting and recycling waste after meals
  - ✓ encouraging children to bring food in reusable containers for their lunch
  - ✓ children fertilizing the garden using "worm tea"

- ✓ drawing babies and toddlers attention to natural objects and smells
- ✓ children having the opportunity to explore and investigate their natural environment through

Environmental responsibility and sustainability education included in the service's statement of philosophy and induction manual for staff. For example, sustainable development objectives may be included in job descriptions and selection criteria for staff.

- **Some form of Environment Management Plan developed by the service**
  - ✓ An educator or family day care coordinator appointed to champion and motivate all staff, children and their parents to "go green".
  - ✓ Recycling bins for paper, plastic and other products.
  - ✓ Water saving devices, such as rainwater tanks.
  - ✓ Environmentally friendly pest management and cleaning products used at the service.
  - ✓ Children have regular opportunities to play in the natural environment and make use of loose parts (eg rocks, twigs, leaves) as part of their play

- **How can environmental responsibility and sustainability be demonstrated with parents / caregivers**

Family day care services can demonstrate their commitment to environmental responsibility and sustainability in very practical ways, although it may be on an adapted scale. Just as with centre-based services, the key is that environmental initiatives are embedded into the program and involve not only the children but also the educators, parents, caregivers, families and the wider community. Sustainable procurement processes require a balanced approach to acquiring goods and services. The needs of the organisation are met in a way that benefits not only the organisation itself, but also society, the broader economy and the natural environment.

1.3 Action plans

An action plan is a critical part of implementing an environmental initiative. Action plans are simple but effective tools for managing any type of project. An action plan summarises all the elements of SMART targets in a table format. The status column is helpful for presenting a snapshot of progress. A project is green when it is on track to be achieved or is completed. A yellow project may be slightly off track, but there is a recovery plan in place. Red projects are not progressing to target and are not expected to meet timing. Some action plans also include gap information; for example, by how many percentage points a target is currently being missed.

Table 2: Example 0f action plan

Area of activity	Target	Actions		Person responsible	Timing	Status
Office paper	No office paper with general rubbish.	Recycle	Remove individual bins near desks.	Administration manager	Within three weeks	Green
Rubbish	Reduce cardboard packaging in rubbish by 60 per cent.	Reuse	Work with suppliers to introduce reusable packaging.	Purchasing officer	Within six months	Yellow
Litter	Reduce cigarette butts around door by 90 per cent.	Introduce butt bin outside the door.		Facilities manager	Within four weeks	Red

- **Green office programs**

Some organisations refer to the initiatives targeted at improving the environment as green office programs. For example, the actions listed in the action plan may form a small part of the green office program for an organisation. The green office program could focus on common

office issues such as recycling, reducing paper wastage, reducing energy usage and commingled recycling programs

- **Use the waste-management hierarchy**

The waste-management hierarchy adopts the principle that prevention is better than cure. If there is no waste generated in the first place, then it will not need to be recycled or otherwise disposed of. Disposal is the smallest part of the pyramid because it is the least preferred method of dealing with waste. This waste management hierarchy forms part of some environmental legislation. Recovering materials means to take materials that have been recycled and use them, without any further processing. A builder may use bricks, doors or bluestone salvaged from one project for another project. Treatment, on the other hand, means using materials that have been recycled, but require an additional step before they can be used. Waste water, or grey water, can sometimes be reused depending on what else is in the water. However, it often requires some treatment to remove any contamination first. Disposal means sending waste to landfill. This is the least preferred method and should only be considered as a last option.

Figure 8: Method of disposal

- **Make compliance easy**

A system encouraging environmentally responsible choices will help people reduce their environmental footprint. Try to set things up so that saving energy or reducing waste is the easiest choice. For example, use timers for appliances, equipment and lights where possible. The investment for timers will be funded by the energy saved in the long run. Sensor lighting in areas that are not used all the time, such as storerooms or conference rooms, can help ensure lights are not on unnecessarily

Self-Check - 1	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Sustainable practices are the processes services employ to maintain the qualities that are valued in the physical environment.
2	Environmental responsibility is one aspect of sustainability.
3	The waste-management hierarchy adopts the principle that prevention is better than cure.

Note: the satisfactory rating is as followed

Satisfactory	3 points
Unsatisfactory	Below 2 points

Information Sheet- 2	Carrying out environmentally sustainable energy management policies

2.1 Carrying out environmentally sustainable energy management policies

Sustainable energy management is a key issue for companies today. As long-term strategic thinkers, energy entrepreneurs must be closely involved in these practices. They play an important role in helping their organizations make more sustainable energy choices. Energy entrepreneurs support energy consumption reduction efforts with their in-depth knowledge of energy costs. And they help steer management towards the right decisions for using renewable energy.

Sustainability aims at striking the right balance between a company's financial considerations and its impact on people and the planet. Energy entrepreneurs can play an important part in increasing profitability while diminishing companies' environmental impact. Too often, companies shoot from the hip in their sustainable energy management efforts, rather than deploy a well-structured approach. This can lead to sub-optimal investments, with less carbon saved per euro or dollar invested.

2.2. The different steps of sustainable energy management

- **Step 1: Set up a sustainability strategy:**

An energy entrepreneur will always develop an effective sustainable energy strategy to support his/her actions. Sustainability efforts will generate better results if they are based on a sound, comprehensive strategy. These strategies set clear targets and provide a coherent framework for utilizing the appropriate resources to achieve these goals.A wide-range of different actors and stakeholders have an interest in sustainable energy use, such as: your industry, clients, government authorities, investors, and your financial bottom line, current & future employees .For example, think about:

- ✓Which targets should be set?
- ✓How to structure and finance your consumption reduction efforts.
- ✓How to deal with on-site renewable energy generation and cogeneration projects.
- ✓How to green your remaining off-grid supply.

Some companies will kick off their corporate sustainability efforts by defining a strategy for sustainable energy management. Others have already designed their sustainability strategy and simply need to fine-tune the broader strategy as it relates to energy management. In all cases, a strategy assessment is a good starting point for greening your energy supply in a more effective manner.

- **Step 2: Identify the most appropriate sustainable energy technologies:**

On-site: solar panels, windmills, biomass projects, cogeneration, and other renewable energy. With a sustainable energy technology "scan", you can find out which of them make the most sense for:

- ✓ Reaching your sustainability goals.
- ✓ Achieving good rates-of-return on your sustainability projects.
- ✓ Improving your security-of-supply, e.g. in a remote area.
- ✓ A sustainable energy technology scan will allow you to optimize your choices when it comes to deciding where to make your green energy investments. It will scan the potential of your different sites regarding:
- ✓ Economics: investment costs, savings potential on total cost of energy, subsidies.
- ✓ Technical aspects: availability of resources such as wind, solar or biomass, availability of project partners.
- ✓ Regulatory aspects: government obligations and possibilities / restrictions for obtaining permits.

- **Step 3: Negotiate self-generation contracts:**

The negotiation of contracts for self-generation is often neglected. Contracts are signed without much negotiation or market research. The first project developer that walks through the door often gets the deal. This is unfortunate as we have observed time and again that running an RFP and conducting negotiations leads to important improvements in contract terms. And that generates a lot of money, as these types of contracts are often long-term in nature. It's even worth taking the professional procurement approach a step further in this process. Before you start talking about a self-generation project, you should first analyze the inputs and outputs of e.g. a cogeneration. This will give you a solid basis for launching a request-for-proposals.

This puts you in the driver's seat. You decide what you want the market to offer to you rather than passively accepting the first proposal that comes through the door. This more commercial approach to self-generation projects also leads to a different way of calculating returns-on-investment. A good insight into costs and revenues will result in better forecasts, as the increase or decrease of returns produced by the fluctuations of the market is taken into consideration.

- **Step 4: Trade green commodities**

More and more companies trade green commodities. If you are involved in an emission trading mechanism, you have a portfolio of carbon emission rights that you can trade. And if you produce green energy, you might have certificates that are tradable. Setting up and implementing a good strategy for green commodities trading can significantly improve the return on your investments. Integrating your green commodities strategy into your broader energy procurement strategy will result in a more business-cantered approach to sustainability.

Self-Check – 2	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	An energy entrepreneur will always develop an effective sustainable energy strategy to support his/her actions.
2	Sustainable energy management is a key issue for companies today.

Note: the satisfactory rating is as followed

Satisfactory	2 points
Unsatisfactory	Below 2 points

3.1. Renewable energy technologies

Primary energy sources are converted into energy services in a number of different ways, using different energy carrier's electricity or fuels, and conversion types (thermal or kinetic) and usable energy flows (heat or work.

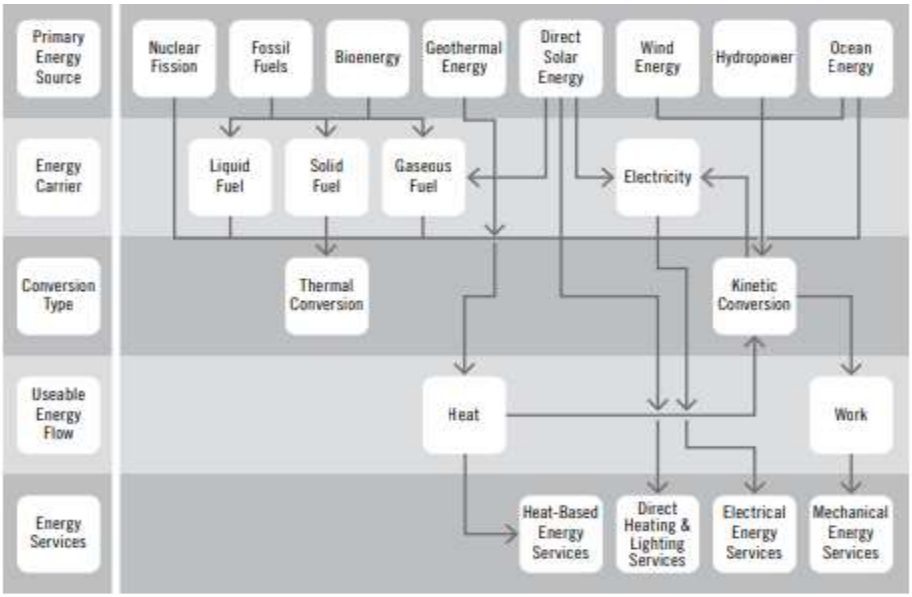


Figure 9: Energy paths from primary energy sources to energy services

Different types of technology are applied to convert renewable energy sources into energy supplies.

3.2 Wind:

turbines are used to convert wind into electricity. A group of turbines forms a wind farm.

- **There are two main types of wind farm**:
  - ✓ onshore wind farms where the wind farm is sited on land, typically in a place exposed to wind such as a hill top or coastal location
  - ✓ Offshore wind farms where the wind farm is sited at sea

    Both types of wind farm require significant investment in site preparation, and to link the wind farm to the electricity grid. Offshore wind energy generally requires a larger

investment to put a substantial foundation in place, and may cost more to connect to the electricity grid.

3.3 Solar: is obtained from the sun's radiation and it can be converted to electricity or heat It.

- **There are three main types of solar technology**:
  - ✓ Photovoltaic panels are used to convert sunlight directly to electricity.
  - ✓ Solar thermal technologies are used to heat water.
  - ✓ Concentrated solar power (CSP) technologies use mirrors to concentrate heat from the sun to heat water, with the heat then being used to generate electricity.

3.4 Value chain

- **The renewable energy sector has four major elements to its value chain**:
  - ✓ Equipment manufacture and distribution
  - ✓ Project development
  - ✓ Construction and installation
  - ✓ Operations and maintenance

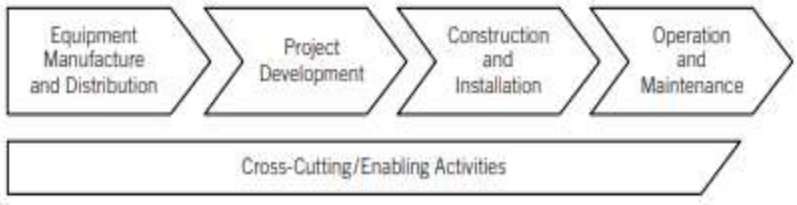


Figure 10: renewable energy value chin

All renewable energy subsectors require substantial investment in capital equipment, which is supplied from equipment manufacturers. Examples include wind turbines, water turbines, solar panels and biomass digesters. All substantial renewable energy projects involve an important project development phase in which the project is designed, planning and other regulatory permissions are sought, negotiations take place with regulatory authorities and often local residents are consulted. Any substantial renewable energy project requires major investment in site preparation, installation and commissioning of the facility, and on most projects it is at this point in the value chain that by far the largest number of people is employed.

The components of a PV installation which are defined as electrical work and therefore require a licensed electrician to perform or supervise; the number of licensed electrical workers required to oversee non-licensed workers who also perform electrical work Licensing and certification requirements are important considerations for states and local jurisdictions because these requirements directly impact.

Figure 11 : Sustainable Solar Education

- **Skill is needed to be a solar energy system engineer**

Table 3: required skills for the PV system

Active Listening	Service Orientation
Time Management	Critical Thinking
Writing	Judgment and Decision Making
Complex Problem Solving	Speaking
Monitoring	Science
Mathematics	Coordination
Instructing	Reading Comprehension

- **Knowledge is needed to be a solar energy system engineer**

Table 4: Knowledge needed for solar system

Engineering and Technology	Design
Building and Construction	Mathematics
Computers and Electronics	Physics - Knowledge
Mechanical - Knowledge	English Language
Monitoring	Customer and Personal Service
standards for service	Education and Training
Sales and Marketing	Administration and Management

Self-Check – 3	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	All renewable energy subsectors does not require substantial investment in capital equipment.
2	Turbines are used to convert wind into electricity.
3	Photovoltaic panels are used to convert sunlight directly to electricity.

Note: the satisfactory rating is as followed

Satisfactory	3 points
Unsatisfactory	Below 2 points

Information Sheet- 4	Identifying and taking action solutions to non-routine problems

4.1. Non-routine problem solving

Non-routine problem solving requires some degree of creativity or originality. Non-routine problem solving serves a different purpose than routine problem solving. While routine problem solving concerns solving problems that are useful for daily living in the present or in the future, non-routine problem solving concerns that only indirectly. Non-routine problem solving is mostly concerned with developing students' mathematical reasoning power and fostering the understanding that mathematics is a creative endeavour. Non-routine problem solving can be challenging and interesting.

- The following is an example of a problem that concerns non-routine problem solving

Consider what happens when 35 is multiplied by 41. The result is 1435.

Notice: That all four digits of the two multipliers reappear in the product of 1435 (but they are rearranged). One could call numbers such as 35 and 41 as pairs of stubborn numbers because their digits reappear in the product when the two numbers are multiplied together. Find as many pairs of 2-digit stubborn numbers as you can. There are 6 pairs in all (not including 35 & 41).

- **Comparing routine and non-routine problem solving**

To make clearer the distinction between routine and non-routine problem solving, consider the following two problems. Both are suitable for grade 3. Problem 1 my mom gave me 35 cents. My father gave me 45 cents. My grandmother gave me 85 cents. How many cents do I have now? Problem 2 Place the numbers 1 to 9, one in each circle so that the sum of the four numbers along any of the three sides of the triangle is 20. There are 9 circles and 9 numbers to place in the circles. Each circle must have a different number in it.

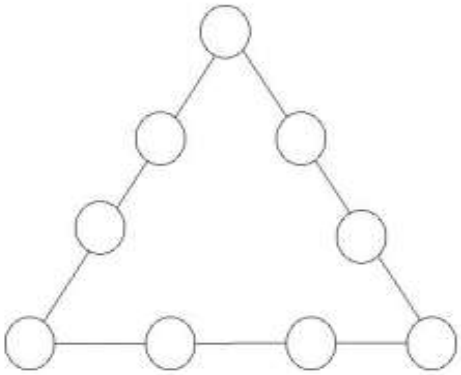


Figure 12: routine problems

Figure 13: Best residential solar power system

- **In order to be effective at problem solving you are likely to need some other key skills, which include:**

✓ **Creativity.**

Problems are usually solved either intuitively or systematically. Intuition is used when no new knowledge is needed - you know enough to be able to make a quick decision and solve the problem, or you use common sense or experience to solve the problem. More complex problems or problems that you have not experienced before will likely require a more systematic and logical approach to solve, and for these you will need to use creative thinking. See our page on Creative Thinking for more information.

✓ **Researching Skills**

Defining and solving problems often requires you to do some research: this may be a simple Google search or a more rigorous research project. See our research methods section for ideas on how to conduct effective research.

✓ **Team Working**

Many problems are best defined and solved with the input of other people. Team working may sound like a 'work thing' but it is just as important at home and school as well as in the workplace. See our Team-Working page for more.

✓ **Emotional Intelligence.**

It is worth considering the impact that a problem and/or its solution has on you and other people. Emotional intelligence, the ability to recognize the emotions of yourself and others, will help guide you to an appropriate solution. See our Emotional Intelligence pages for more.

✓ **Risk Management**

Solving a problem involves a certain amount of risk - this risk needs to be weighed up against not solving the problem. You may find our risk management page useful.

- ✓ **Decision Making**

  Problem solving and decision making are closely related skills, and making a decision is an important part of the problem solving process as you will often be faced with various options and alternatives. See decision making for more.

Self-Check – 4	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Non-routine problem solving requires some degree of creativity or originality.
2	Non-routine problem solving is mostly concerned with developing students' mathematical reasoning power.

Note: the satisfactory rating is as followed

Satisfactory	2points
Unsatisfactory	Below 2 points

Information Sheet- 5	Undertaking on-going checks to quality of work

5.1 Introduction

Work quality is the value of work delivered by an individual, team or organization. This can include the quality of task completion, interactions and deliverables. Work quality is a common consideration in managing the performance of programs, projects, vendors and individuals.

5.2. Steps in the implementation of a Quality

- **Step 1**: Identify Organizational Goals
- **Step 2**: Identify Critical Success Factors
- **Step 3**: Identify Internal and External Customers
- **Step 4**: Customer Feedback
- **Step 5**:ImplementContinuous Improvements

5.3 Quality Control: is measures taken to monitor the quality of the test itself. Quality control ensures that the test is working correctly and the tester can report accurate test results with confidence. Quality control(QC) is a process through which a business seeks to ensure that product quality is maintained or improved. A major aspect of quality control is the establishment of well-defined controls

- **Advantages of quality management systems**
  - ✓ Greater efficiency and less waste
  - ✓ Better and consistent control of major business processes.
  - ✓ a better understanding of customer needs
  - ✓ Regulation of successful working practices
  - ✓ Improved risk management
  - ✓ Increased customer satisfaction
  - ✓ Improved participation of employees
  - ✓ Better internal communication

5.3. Best solar panels for cloudy days

There are different types of solar panels available on the market, you need to know how each type works, its capacity of power generation and price to buy a one for yourself. Mon crystalline solar panels: this is the most efficient type of solar panel its efficiency rate is 20% and best for commercial use. They give maximum performance no matter how the outdoor conditions are.

- **Does a Cloudy Day Affect Solar Energy Generation?**

Anyone who has gotten sunburned on a cloudy day knows that solar radiation penetrates clouds. For that same reason, solar panels can still produce electricity on cloudy days. But depending on the cloud cover and the quality of the solar panels, efficiency can drop to anywhere from 10 to 25 percent of the energy output seen on a sunny day. Fortunately, Sun Power with a record-breaking efficiency of more than 22 percent (highest efficiency panels commercially available use cells with a unique one-of-a-kind design that capture a broader range of the sun's light including red and blue wavelengths. They make more energy than conventional panels on a cloudy day, making them a good choice for cloudy climates or if trees partially shade your roof during certain times of day. We also design into our cells a “backside mirror” that uses a thin layer of aluminum that bounces some of the light photons that are not absorbed on their first pass through a cell back into the cell to have a second chance for absorption. This results in greater output of electrons from the same input of light.

- **Factors that affect the solar system or PV system**

Table 5: Factors that affect the solar system

Cloud cover	degree
Location	Latitude
Shad	climate
sun intensity	isolation
relative humidity	Climate conditions

Self-Check - 5	Written Test

Instruction: Follow the below selected instruction

Write true if the statement is correct and write false if the statement is wrong.

N°	Questions
1	Mon crystalline Solar Panels are the most efficient type of solar panel.
2	A process through which a business seeks to ensure that product quality is called quality service.
3	Work quality is the value of work delivered by an individual, team or organization.

Note: the satisfactory rating is as followed

Satisfactory	3 points
Unsatisfactory	Below 2 points

Solar PV System Installation and Maintenance

Level IV

Learning Guide -33

Unit of Competence	**Implement and Monitor Energy Sector Environmental and Sustainable Policies and Procedures**
Module Title	**Implementing and Monitoring Energy Sector Environmental and Sustainable Policies and Procedures**
LG Code	**EIS PIM4 M09 LO3-LG-33**
TTLM Code	**EIS PIM4 TTLM 0920v1**

LO3- Complete the implementation and monitoring of environmental and sustainable energy management policies and Procedures

Presenting and discussing Report with higher Authority.

Instruction Sheet	Learning Guide:-33

This learning guide is developed to provide you the necessary information, knowledge, skills and attitude regarding the following content coverage and topics:

- checking Undertaken work against schedule and identifying solutions
- Rehabilitating, cleaning and confirming work site
- Cleaning, checking and returning tools, equipment to storage
- Identify and store materials suitable for recycling and or reuse
- Reviewing and updating policies for implementing and monitoring
- Signing relevant work permit(s)
- Setting new targets for energy minimization
- Promoting successful strategies are rewarding participants

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:-

- check Undertaken work against schedule and identifying solutions
- Rehabilitate, clean and confirm work site
- Clean, check and return tools, equipment to storage
- Identify and store materials suitable for recycling and or reuse
- Review and update policies for implementing and monitoring
- Signing relevant work permit(s)
- Settee new targets for energy minimization
- Promote successful strategies are rewarding participants

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks

Information Sheet 1	Checking Undertaken work against schedule and identifying solutions

1.1 Introduction

Sustainable energy management is a key issue for companies today. As long-term strategic thinkers, energy entrepreneurs must be closely involved in these practices. They play an important role in helping their organizations make more sustainable energy choices. Energy entrepreneurs support energy consumption reduction efforts with their in-depth knowledge of energy costs. And they help steer management towards the right decisions for using renewable energy

1.2 The different steps of sustainable energy management

- **Set up a sustainability strategy**

An energy entrepreneur will always develop an effective sustainable energy strategy to support his/her actions. Sustainability efforts will generate better results if they are based on a sound, comprehensive strategy. These strategies set clear targets and provide a coherent framework for utilizing the appropriate resources to achieve these goals

- **Identify the most appropriate sustainable energy technologies**

On-site solar panels, windmills, biomass projects, cogeneration, and other renewable energy. With a sustainable energy technology “scan”, you can find out which of them make the most sense for:

- ✓ Reaching your sustainability goals.
- ✓ Achieving good rates-of-return on your sustainability projects.
- ✓ Improving your security-of-supply, e.g. in a remote area

- **Trade green commodities**

More and more companies trade green commodities. If you are involved in an emission trading mechanism, you have a portfolio of carbon emission rights that you can trade. And if you produce green energy, you might have certificates that are tradable. Setting up and implementing a good strategy for green commodities trading can significantly improve the

return on your investments. Integrating your green commodities strategy into your broader energy procurement strategy will result in a more business-cantered approach to sustainability

- **planning and scheduling**

A Project Plan is prepared which is defined as a management summary document that describes the essentials of a project in terms of its objectives, justification and how the objectives are to be achieved. It describes how all of the major activities under each project management function are to be accomplished, including that of overall project control. The project plan will evolve through successive stages of the project life cycle. A Project Plan is developed once the Business Case and Project Charter have been defined. It is assumed that the Business Case and the Project Charter have been prepared prior to the execution of this Phase and are of an acceptable quality and standard. Project planning is defined as developing the basis for managing the project, including the planning objectives, deliverables, interim work products, procedures, organisation, chain of activities, resources types and numbers, timing, routines and finances.

Project scheduling is one of the critical management tasks as it dictates the time frames in which the project will be completed, the budgets/costs in terms of resource requirements and the sequence of tasks to be completed. Project scheduling is defined as the process of determining when project activities will take place depending upon defined durations and precedent activities. Schedule constraints specify when an activity should start or end, based on duration, predecessors, external predecessor relationships, resource availability, target dates or other time constraints. Project scheduling is a complex and iterative task which typically involves:

- Assigning resources to project tasks;
- Balancing completion dates against the availability of the appropriate resources to complete all tasks within the available time;
- Identifying dependencies between tasks so that they are scheduled in the correct sequence;

- Identifying realistic start and end points (elapsed time) to accommodate the number of man-days work for each given task;
- Critical path analysis to identify those tasks which are critical to the success and timely completion of the project.

The Project Schedule includes the planned dates for starting and completing activities in one or more of the following forms:

- ✓ Milestone;
- ✓ Deliverable;
- ✓ Activity;
- ✓ Gantt.

A Project Schedule is often confused with or referred to as a Project Plan. From the definitions above, it can be seen that the Project Schedule, whilst a key deliverable, is only one component of a Project Plan. The Project Plan assists a Project Manager in communicating with business work streams and gaining support for the project. A business manager with no technical knowledge should be able to understand the essence of the project through the project leader, the project concept and the project plan.

Self-Check – 1	Written Test

Instruction: Follow the below selected instruction

Choose the best option & circle the letter of your choice.

N°	Questions and answers
1	Witch one of The following is not Project Schedule includes the planned dates for starting and completing activities forms A. Deliverable B. Activity C. Gantt D. None of the above
2	_____Is prepared which is defined as a management summary document that describes the essentials of a project in terms of its objectives. A. Project scheduling B. Project Plan C. A and B D. Noun of the above
3	Witch one of The following is with a sustainable energy technology of them make the most sense. A. Reaching your sustainability goals. B. Achieving good rates-of-return on your sustainability projects. C. Improving your security-of-supply, D. All the above
4	_____ is one of the critical management tasks as it dictates the time frames in which the project will be completed. A. Project scheduling B. Project Plan C. A and B D. Noun of the above

Note: the satisfactory rating is as followed

Satisfactory	3 points
Unsatisfactory	Below 3 points

Information Sheet 2	Rehabilitating, cleaning and confirming work site

2.1. Introduction

This Information Sheet removes and vacuums each furniture cushion, and the Rehabilitating. Try vacuuming twice if you feel any residual dust after the first round. Clean surfaces from the top down. Start by wiping the dust off your walls yes, even your walls collect dust during construction

2.2. Pre-Construction Work

Notice to Proceed will be issued within three days after signing the contract. The contract period begins on the day the Notice to Proceed is issued. The Engineer and Contractor will carry out a joint condition-in survey using video or digital photographs to record the condition of the site upon handover to the Contractor. This will determine the state of the site that the Contractor must hand back upon completion of the works. The Contractor will carry out a detailed site set out survey for the works. The contractor may not precede with on-site mobilization or solar construction works before the Engineer approves the following documentation that shall be covered in Program:

- Condition-in Survey
- Site Survey
- Work Method Statement
- Program
- Quality Assurance / Quality Control Plan (QA/QC) as per minimum Contractor's Quality Control Plan specification.
- Health and Safety Plan (H&S) as per minimum requirement Health and Safety Specification
- Environmental Protection Plan as per minimum requirement .
- Dust and Noise Protection Plan
- Schedule of Materials and Installed Equipment

A Pre-Construction Meeting will be held between the Engineer and the Contractor to review the above documentation. If the documentation is incomplete, the Contractor will have three calendar days to revise and resubmit the documentation for approval.

a. Site restrictions

Site security limitations: Comply with any restrictions on site area, access or working times advised by the Engineer. Access: Access on to and within the site, use of the site for temporary works and constructional plant, including working and storage areas, location of offices, workshops, sheds, roads and parking, is restricted to the areas shown on the drawings or as agreed with the Engineer.

b. Occupied Areas of Site or Buildings

For the parts of the site designated as occupied areas in the Occupied Areas schedule: Allow occupants to continue using the area for the required period. Make available safe access for occupants. Arrange work to minimise nuisance to occupants and ensure their safety. Protect occupants against weather, dust, dirt, water or other nuisance, by such means as temporary screens.

c. Protection of persons and property

Temporary works: Provide and maintain required barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting and traffic flagging. Access ways, services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of such services. If damage occurs, immediately repair it at the Contractors cost.

2.3. Construction Plant

- **Use of Existing Services**

Existing services may be used as temporary services for the performance of the contract subject to conditions stated in the Existing Services schedule.

- **Contractors Facilities and Work Practices**

The Contractor is required to provide adequate toilet and washroom facilities for his staff. These facilities shall be kept clean and serviceable at all times.

The Contractor is required to provide adequate first aid equipment on-site, failure of the Contractor to ensure the availability of first aid equipment on-site will result in an immediate ‘stop work’ order being issued. All costs and time delays resulting from any such ‘stop work’

order is entirely the Contractors responsibility. A site office will be established by the Contractor at the work site. The location of the site office will be identified by the Engineer to the Contractor. The office will have a complete set of the contract documents. The Contractor is to maintain a safe, healthy and tidy worksite at all times and all work activities are to be performed with protective and safety equipment appropriate for the task. The Contractor is entirely responsible for workplace safety and unsafe work practices will be identified and recommendations made for revised work methods as appropriate. The Contractor will be required to comply to the approved Health and Safety Plan.

Project Signboards

Provide project-specific signboards and the following:

- Location, size and wording as directed by Engineer.
- Maintain in good condition for duration of the work.
- Remove on completion.

Obtain approval before display of advertisements or provision of other signboards.

2.4. Site the Works

Table 6: Site the Works

Surveys	
Setting out:	Set out the works from the dimensioned drawings
Check surveys:	Check the set out regularly on site
Final survey:	Confirm final set out of roads, services and buildings on the as constructed drawings after Practical Completion

- **Survey marks**

Definition: The term “survey mark” means a survey peg, bench mark, reference mark, signal, alignment, level mark or any other mark used or intended to be used for the purpose of setting out, checking or measuring the work. Care of survey marks: Preserve and maintain the survey marks in their true positions. The Contractor shall check survey marks for consistency and if there are inconsistencies, the Contractor shall give written information to the Engineer with his

proposed corrections. If the survey marks are damaged, the Contractor shall immediately advise the Engineer and rectify the damage.

- **Contractor's Representative**

The contractor must employ a suitably experienced engineer as the Site Manager. This person must be on site during working hours, and fluent in English and technical terminology. The Contractor's Site Manager will have the authority to make all decisions concerning the project on behalf of the Contractor.

- **Program of Work**

The Contractor is to provide a construction baseline program with MS Project which has the following information:

- ✓ Sequence of Work.-(Work Breakdown Structure)
- ✓ Activity inter-relationships.-(Should be closed loop)
- ✓ Activity durations with start and finish dates
- ✓ Periods within which various stages or parts of the work are to be executed.

- **Time scale: Calendar Days**

Line items in program are to be based on UNDP Bill of Quantities numbering system (see index). Update the program weekly. Submit hardcopy and softcopy. Identify changes since the previous version, and show the actual starts and finishes, actual percentage of completion for each item of work.

- **Site Meetings**

Hold and attend weekly site meetings throughout the contract and ensure attendance of appropriate subcontractors, the Site Manager and Engineer. The meeting schedule may be modified by the Engineer. The meeting will consider the following items:

- ✓ Technical issues.
- ✓ Commercial issues.
- ✓ Program.

- **Items Supplied by Owner**

Materials and other items identified in the Items to be Supplied schedule will be supplied free of charge to the Contractor for installation in the execution of the works. Unload and take delivery of them, inspect them for defects and then take care of them. If defects are found, advise. Return unused items to the owner.

2.5. Completion of the Works

- **Final Cleaning**

Before Practical Completion, clean throughout, including interior and exterior surfaces exposed to view. Clean carpeted and soft surfaces. Clean debris from the site, roofs, gutters, and downpipes and drainage systems. Remove waste and surplus materials.

- **Reinstatement**

Before practical completion, clean and repair damage caused by installation or use of temporary work and restore existing facilities used during construction to original condition.

- **Adjoining Property**

At practical completion, for properties described in the Adjoining Properties to be Recorded schedule inspect the properties with the Engineer and owners and occupants of the properties, recording any damage that has occurred since the pre-commencement inspection.

- **Post Construction Works**

The Contractor will provide the following documentation after all site construction has been completed:

- ✓ Warranty Statement
- ✓ Material Test Certificates
- ✓ As-Built Drawings
- ✓ List of the suppliers with their contact information
- ✓ Spare materials, where applicable

A condition-out survey will be conducted with the Contractor and Engineer at which damages caused by the Contractor will be identified. The Engineer will determine if the Contractor is to make repairs or if the damage will be deducted from the Contractor's final invoice.

- **Removal of plant**

Within 10 working days after practical completion, remove temporary works and construction plant no longer required. Remove the balance before the end of the defects liability period.

2.6. Payment for the works

- **Anticipated Progress Claims Schedule**

The method of measurement and payment will be SMM7 – Standard Method of Measurement for Building Works (latest version). The Contractor is to submit a schedule of anticipated progress claims which will be made throughout the contract. Submit a revised schedule with each progress claim.

2.7. Rehabilitating solar services

Table 7: solar services

New Installs	We would love to talk to you about your power needs and explore whether a solar system will be best for you and your home. Feel free to contact us and see our our process page for more information on new solar system installs.	
Home Batteries	Solar systems can make peak power during the day, but any energy you're not using at that moment is put back on the power grid and shared with your neighbours. Now the power	

	company does give you a credit for all the power you are making them. But how nice it would be to capture all the extra power your making.	
Main Panel Upgrades	Is your old electrical panelling tripping and giving you nothing but problems? Contact us to schedule a main panel upgrade. Getting rid of the headache is easier than you think!	
System Trouble shooting	Having an existing system that doesn't seem to be eliminating your bill anymore? We would be happy to come out and take thorough look at your system. We will identify any issues with your system and give you a complete report	
Panel Cleaning	Like anything in life, if you keep it clean and well maintained, it will last you! The same goes with your solar panel system. Dust and debris can build up on your solar panels and eventually affect your production of solar energy. We offer yearly, and bi yearly cleaning plans.	

Inspections	Purchasing a home with solar? We get our homes inspected for termites and other damages, but solar systems as of yet are rarely inspected.	

Self-Check - 2	Written Test

Choose the best option & circle the letter of your choice.

N°	Questions and answers
1	Intended to be used for the purpose of setting out, checking or measuring the work. A. Contractor's Representative B. Program of Work C. Survey marks D. Site Meetings
2	Like anything in life, if you keep it clean and well maintained, it will last you! The same goes with your solar panel system A. Home Batteries B. New Installs C. Main Panel Upgrades D. Panel Cleaning
3	One of the following is not Provide project-specific signboards A. Location, size and wording as directed by Engineer. B. Activity durations with start and finish dates C. Maintain in good condition for duration of the work. D. Remove on completion
4	We would love to talk to you about your power needs and explore whether a solar system will be best for you and your home A. Home Batteries B. New Installs C. Main Panel Upgrades D. Panel Cleaning

Satisfactory	3 points
Unsatisfactory	Below 3 points

Information Sheet -3	Cleaning, checking and returning tools, equipment to storage

3.1. Introduction

Store your cleaning supplies in an area that is clean and free of debris. Make sure that there aren't any temperature extremes in the area where your cleaning supplies are stored. Another thing to make sure of is that the area is dry. Keep cleaning supplies in their original containers How to clean and Maintain your solar equipment. One of the many benefits of solar panels is their durability. Systems typically come with20-year warranties, and panels can last upward of 40 years. While solar panels don’t require extensive care, proper maintenance and occasional cleaning can help extend their lifespan and efficiency.

Figure 14: Clean and Maintain Your Solar Equipment

- **Why should i clean my solar panels?**

The more direct sunlight solar panels can absorb, the more energy they create. Dirt, debris, snow, and even bird droppings can build up on your panels and block sunlight. The National Renewable Energy laboratory reported that dirty solar panels lose up to25 percent efficiency. Keeping your panels clean helps ensure good power production.

- **How often do i need to clean my solar panels?**

There's no standard time frame for cleaning your solar panels, as it largely depends on your geographic location. The average solar panel owner will need to clean their panels only once or twice a year. Set a reminder on your calendar to check your solar panels seasonally to evaluate the debris and see if it's time for a cleaning. There are a few exceptions to this general maintenance guideline. If you live near a freeway or airport, oil and pollutants can build up on your panels, meaning they will require more frequent cleaning. In a cold-weathered climate, you'll want to keep your panels clear of snow during winter, and in desert climates, you may need to clean your panels after storms or strong winds to remove dirt, dust, and sand.

Figure 15: solar cleaning

3.2. The Importance of Properly Maintaining Your Tools

Good Quality tools can be a big investment, but if you take good care of them, they will last longer and return the favor. Making sure your tools are properly stored, cleaned, and well maintained will save you time and money as well as making your projects and jobs much easier. When it comes to storing your tools you have to work with the space that you have. Maybe you hang them on a pegboard or store them in toolboxes, bags, or chest or maybe you keep them in drawers. Pegboards are a great storage system for tools. They let you see all your tools at one glance and they make use of wall space in an efficient way. If you don't have enough wall space for a peg board you can take advantage of the pegboard system by building a hinged system, a rolling pegboard, or even a portable pegboard system

Toolboxes are also a great way to store your tools. They have the great advantage of portability. While some people do use toolboxes to store all their tools, they can also be a convenient way to transport your most commonly used tools while leaving the bulky tools stored at home.

Figure 16: Tools

Self-Check – 3	Written Test

The following are true or false items, write true if the statement is true and write false if the statement is false.

N°	Questions
1	Systems typically come with20-year warranties, and panels can last upward of 40 years
2	The average solar panel owner will need to clean their panels always or every day through the year.
3	Making sure your tools are properly stored, cleaned, and well maintained will save you time and money.
4	The National Renewable Energy laboratory reported that dirty solar panels lose up to99 % efficiency. Keeping your panels clean helps ensure good power production

Satisfactory	3 points
Unsatisfactory	Below 3 points

Information Sheet 4	Identify and store materials suitable for recycling and or reuse

4.1. Introduction

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. Recycling can benefit your community, the economy and the environment.

4.2. How does recycling save energy?

When we make new products out of virgin materials, we expend energy to extract and process those materials. This includes burning fossil fuels. However, if we manufacture products using recycled materials, we reduce the need for virgin materials and save the energy required to extract and process them. To estimate how much energy you can save by recycling certain products, EPA has developed a tool called the individual Waste Reduction Model. This tool calculates how much energy you save by recycling aluminum cans, glass or plastic bottles, magazines or plastic grocery bags, and shows you how long those savings could power different electrical appliances.

4.3. Solar panel recycling is important for the future of solar

Solar energy is inexpensive and environmentally friendly– until your solar panels have reached the end of their lifetime. After about 30 years, many crystalline silicon solar panels will start having significant dips in energy production and it may be time to replace them or dispose of them entirely. Like any manufactured product, disposing of solar panels is hardly environmentally friendly. Heavy metals like cadmium and lead are found in solar cells, which can harm the natural environment if they are not recycled or disposed of properly. Additionally, solar panels that are carelessly thrown away can end up in large landfills.

4.4. What parts of solar panels can be recycled?

Recycling solar panels can only be effective if the materials used to build them are able to be used again, 30 or more years later. Solar panels are made from several components, including:

- Silicon solar cells
- Metal framing
- Glass sheets
- Wires
- Plexiglas

Right away, it's clear that many of the core components of solar panels can be recycled on their own. Metal, glass, and wiring can all be recycled and re used. Silicon, the component that is most essential to producing electricity, are a slightly different story. While silicon wafers are not recyclable like glass and plastic are, some specialty recycling companies are able to reuse silicon cells by melting them down and reclaiming the silicon and various metals. The difficulty with recycling solar panels isn't that the materials they are made from are hard to recycle; rather, it's that they are constructed from many parts all used together in one product. Separating those materials and recycling them each in a unique way is a complex and potentially expensive process.

4.5. Solar panel recycling options

What are the current options for recycling your old solar panels? Solar panels have traditionally been recycled at general purpose glass recycling facilities, where the metal frames and glass parts are salvaged but the remaining parts are disposed of or burned. Nowadays, there are a few organizations working to make solar panel recycling both complete and mainstream.

- **Recycle PV**

One company looking to bring solar recycling to the U.S. is Recycle PV. Because of the lack of governmental solar recycling requirements, the company has trouble operating on a wide scale locally. Despite this, Recycle PV is partnering with PV Cycle to help move U.S. panels to recycling facilities in Europe. While currently only a small operation compared to some European panel recycling efforts, groups like Recycle PV will almost definitely see the demand for their recycling services grow over the next several years.

- **Solar Energy Industries Association (SEIA)**

SEIA has a PV Recycling Working Group that chooses recycling partners offering benefits to SEIA members. These partners give special pricing to the SEIA members, and in exchange, recycle their solar panels at special facilities. An example of a SEIA recycling partner is the company cleanliness. Operates recycling facilities that aren't dedicated only to solar but can handle recycling panels and other solar equipment.

- **Manufacturer recycling**

Another example of solar recycling efforts comes from manufacturers. Companies like Sun Power and First Solar run global recycling programs for their customers, allowing them to return old solar panels (often through groups like PV Cycle) to the manufacturer to be recycled or repurposed.

- **Solar panels are good for the environment, and recycling is coming**

While solar panel recycling isn't widely available in the U.S. for all of the components in solar panels, there's still a little time before the number of panels needing to be recycled gets too high. Groups like SEIA and Recycle PV are doing important groundwork for the industry, but there's more to do in years to come. Solar panel recycling may not be widespread, but solar energy is still a great financial investment that is environmentally friendly as well. By going solar now, you can cut your electric bill and start saving right away. Sign up for the Energy Sage Solar Market place to receive free quotes from our network of qualified, pre-vetted installers so you can start the process of going solar.

Self-Check - 4	Written Test

Choose the best option & circle the letter of your choice.

N°	Questions
1	Witch One of the following is including Solar panels are components,: A. Silicon solar cells B. Charge controller C. Metal framing D. Glass sheets
2	_____has a PV Recycling Working Group that chooses recycling partners offering benefits to members. A. Recycle PV B. Solar Energy Industries Association (SEIA) C. Manufacturer recycling D. Solar panels are good for the environment, and recycling is coming
3	While solar panel recycling isn't widely available in the U.S. for all of the components in solar panels. A. Recycle PV B. Solar Energy Industries Association (SEIA) C. Manufacturer recycling D. Solar panels are good for the environment, and recycling is coming
4	Because of the lack of governmental solar recycling requirements, the company has trouble operating on a wide scale locally A. Recycle PV B. Solar panel recycling options C. Manufacturer recycling D. good for the environment

Satisfactory	4 points
Unsatisfactory	Below 4 points

Information Sheet 5	Reviewing and updating policies for implementing and monitoring.

5.1. Introduction

Regularly reviewing policies and procedures keeps your organization up to date with regulations, technology, and industry best practices. Policy review ensures that yourpoliciesare consistent and effective. But organizations in every industry should regularly review and revise their company policies.

5.2. Policy

A policy is a succinct high level statement that establishes and sets out the Forces position, or desired position in relation to a relevant and significant issue. A policy should set out what the Force aims to achieve and why. Policy should support and be in line with the Forces Delivery Plan and Values & Behaviors. Policy should provide a basis for consistent decision-making and resource allocation and should be aimed at assuring consistency and fairness in how those decisions are taken within the framework of the Forces Delivery Plan

5.3. Review Policies and Procedures

Policies and procedures are living documents that should grow and adapt with a company. While the core elements of policy may stay the same, the details should change with the industry and the organization. Policy review and revision is a crucial part of an effective policy and procedure management plan. Why is it important to review policies and procedures? Outdated policies can leave your organization at risk. Old policies may fail to comply with new laws and regulations. They may not address new systems or technology, which can result in inconsistent practices. Regularly reviewing policies and procedures keeps your organization up to date with regulations, technology, and industry best practices. Policy review ensures that your policies are consistent and effective. Reviewing policies and procedures is especially important for high-risk or highly regulated industries such as healthcare, public safety, banking, and more. But organizations in every industry should regularly review and revise their company policies

5.4. When to Review Policies and Procedures

With all the pressing daily tasks in the workplace, it's easy for policy review to fall through the cracks. Administrators may know that it's important to review policies and procedures, but other tasks take precedence. However, policy review is best when it's done regularly and proactively. Company leaders shouldn't wait for an incident to occur before they review and update company policies.

5.5. Regular policy and procedure review

The best way to proactively tackle policy and procedure review is just to build it into the corporate calendar. As a general rule, every policy should be reviewed every one to three years. But most experts recommend reviewing policies annually. Policy review doesn't have to be as daunting a task as it sounds. A good policy management software will let you set up workflows to collaborate with your policy review committee, gather feedback, and track approvals.

Self-Check - 5	Written Test

The following are true or false items, write true if the statement is true and write false if the statement is false.

N°	Questions
1	A policy is a succinct high level statement that establishes and sets out the Forces position, or desired position in relation to a relevant and significant issue
2	Charge controller and inverter is a crucial part of an effective policy and procedure management plan
3	The best way to proactively tackle policy and procedure review is just to build it into the solar panel.
4	Policy review doesn't have to be as daunting a task as it sounds.

Satisfactory	3 points
Unsatisfactory	Below 3 points

Information Sheet 6	Signing relevant work permit(s)

6.1. Introduction

Permit to Work (PTW) is a key part of managing work activities that have inherently higher risks or unique aspects that could lead to a higher level of risk than routine or daily work activities. It is supported by other management policies, procedures, and processes to regulate all work activities and manage risk. The purpose of this PTW document is to provide guidance in confirming:

6.2. Responsibilities

- **Permit Authority**

This role is carried out by the Facility/Site/Project Manager and has the following responsibilities:

- ✓ Overall operation of the Permit to Work Procedure in their physical area of responsibility.
- ✓ Ensuring that the Permit to Work procedure is subject to regular monitoring and auditing, action upon the results of these audits to maintain the integrity of the system and proposing any recommendations for system improvement.
- ✓ Authorizing the Area Authority, Performing Authority, and Issuing Authority to carry out their duties, as described in this procedure.
- ✓ Ensuring that the training and competency standards, as defined in this procedure are followed and to satisfy himself/herself that the AA is competent.
- ✓ Authorization of all categories of Work Permits.
- ✓ Approval of Lessons Learned and audits.

- **Area Authority(AA)**

Are responsible for the day-to-day management of the Permit to Work process within their defined area. The Area Authority is normally the FM, DFM, Project Manager, site manager, or equivalent, although any individual can be assigned this role. There can be more than one Area Authority at the site or premises.

- ✓ Have overall responsibility for the safe control of non-routine work activities within their defined area in accordance with the Permit to Work system, including the issue of all Work Permits and associated Certificates.
- ✓ Ensure the appropriate level of risk assessment has been carried out for the task.
- ✓ Liaise closely with the Performing Authority when planning Permits, to ensure that appropriate controls are identified for each identified hazard.
- ✓ Ensure all the agreed control measures are in place; confirm that the Performing Authority fully understands the scope of the task and that other members of the work party have been fully briefed via a safety Toolbox Talk or equivalent means of communication.

- **Issuing Authority (IA)**

The IA may be the Lead Technician or Supervisor responsible for normal operations within a particular discipline. The IA shall be an individual with additional training and understanding of safe practices.

- ✓ The IA may be the AA. If not the AA, the IA will support the AA in the safe control of work activities.
- ✓ This position is responsible to the AA for the management and safety of all activities within the designated area, including the issue of a PTW.

6.3. Types of Permits

Five types of Permits are used within the PTW procedure, each controlling a specific type of job and activity.

a. Hot Work Permit – A hot work permit is required for work involving the use of a flame or other sources of ignition. Some examples include:

- Electrical welding and use of welding machine,
- Flame cutting,
- Grinding (producing sparks)

b. Cold Work Permit – A cold work permit is required for potentially hazardous work not covered by other types of work permits. Some examples include:

- Chemical cleaning or use of solvents,
- Handling of hazardous substances (e.g., toxic/corrosive chemicals, asbestos, etc.)
- Use of resins, typically used during blade repairs,
- Any painting activity,
- Heavy lifts (refer to Crane/Lifting procedure for definition),
- Erecting or dismantling scaffolds,
- Any non-routine and potentially hazardous activity,
- Any activity requiring specific control measures to confirm safety.

c. Electrical Permit – An electrical permit is required for work on electrical systems where there is a possibility of contacting energized electrical conductors. Some examples includes:

- Work involving the installation or repair of electrical conductors,
- Connection or disconnection of electric motors,
- Reaching into any panel, transformer or other electrical enclosure which may have energized circuits, capacitors, wiring, etc.
- Work on instrumentation, instrument panels, or telecom equipment,
- Where removal of a part of the circuit takes place outside normal operating conditions.

d. Confined Space Entry Permit – A confined space entry permit is required to allow personnel to enter a confined space such as a blade, trench, tank, vessel, etc.

e. Ground Disturbance Permit – A ground disturbance permit is required for any excavation or ground disturbance activity that involves digging, trenching, excavating or removing soil or ground.

6.4. Work Certificates and Work Permits

The Missouri Division of Lab or Standards provides Missouri employers, parents, school officials, and youth information and training about workplace safety and health program management, child lab or laws, and youth and employer rights and responsibilities. Missouri's Child Lab or Law applies to youth under the age of 16. Youth under 14 years of age generally are not permitted to work at any job (other than in entertainment or casual work) at any time. Youth who are 14 or 15 generally are permitted to work, but their work (as well as the work of all children in the entertainment industry) is subject to several restrictions.

- **Work Certificates**

Work certificates are required for children 14 to 15 years of age before they start employment at any job (other than in the entertainment industry) during the school year. Work certificates are required regardless of where a child attends school (public school, private school, charter school, home school). Work certificates must be issued by either

a. the public school superintendent of the school district in which the child resides, the chief executive officer of the charter school that the child attends,

b. the public or private school principal of the school that the child attends,

c. the designee of any of these school officials, or

d. If the child is home-schooled, a parent of the child. The issuing officer may decline to issue a work certificate if he or she is not satisfied that employment will serve the best interest of the child. The public superintendent of the school district in which the child resides may revoke a work certificate issued by a public or private school principal, if that is deemed to be in the best interest of the child.

Self-Check - 6	Written Test

The following are true or false items, write true if the statement is true and write false if the statement is false.

N°	Questions and answers
1	----------is required for any excavation or ground disturbance activity that involves digging, trenching, excavating or removing soil or ground. A. Confined Space Entry Permit B. Electrical Permit C. Ground Disturbance Permit D. Cold Work Permit
2	---------- is required to allow personnel to enter a confined space such as a blade, trench, tank, vessel, etc. A. Confined Space Entry Permit B. Ground Disturbance Permit C. Electrical Permit D. Cold Work Permit
3	----------is required for potentially hazardous work not covered by other types of work permits. A. Cold Work Permit B. Ground Disturbance Permit C. Confined Space Entry Permit D. Electrical Permit
4	----------is required for potentially hazardous work not covered by other types of work permits. A. Confined Space Entry Permit B. Ground Disturbance Permit C. Electrical Permit D. Cold Work Permit
Satisfactory	3points
Unsatisfactory	Below 3 points

Information Sheet 7	Setting new targets for energy minimization

7.1. Introduction

This information sheet provides an overview of the main trends emerging from the expansion of renewable energy targets across the world, tracing their use since the introduction of the first ethanol production target in Brazil in the 1970s and the adoption of the first Renewable Energy Standard in the U.S.1 It then addresses key aspects and definitions related to renewable energy targets. The information sheet concludes with a discussion on the theoretical foundations of renewable energy targets.

7.2. Overview of renewable energy targets at the global level

As they have spread around the world over the last two to three decades, renewable energy targets have shifted geographically and have become highly diverse, both in the scope of the energy sources/technologies they cover and in the increasing sophistication in their overall design and enforcement.

7.3. Setting the Goal Posts for Energy Use

Energy efficiency improvement goals, also known as energy efficiency targets, are intended reductions in energy over a specified time frame that has been defined in a smart manner. Targets are useful because they can encourage decision makers to improve the use of energy in their communities and operations. Moreover, energy efficiency targets can have short or long term timeframes and can be implemented on various scales, ranging from the national level down to individual buildings. Cities should explore both mandatory public sector targets and voluntary private sector targets to forge energy-efficient communities

7.4. Public Sector Targets

Setting targets to improve the energy efficiency of a city government's assets such as office buildings, public lighting, schools and hospitals sends a clear message that energy efficiency is something the city values. Further, governments with large assets under their control are capable of significantly influencing local markets, and can provide local businesses with opportunities and increased capacity. Cities can also lead by example by defining an energy

reduction goal and achieving it, demonstrating their usefulness. Government led efficiency projects produce useful case studies in retrofitting assets, which provide models for the private sector.

7.5. Inspiring the Private Sector through Voluntary Targets

To stimulate energy efficiency in the private sector, governments can introduce voluntary targets, incentivizing them to take action. For example, a city could ask real estate owners to sign up for a challenge with the aim of meeting an efficiency target; the winner of the competition is awarded the title of "biggest loser" (of energy consumption). Contests like this one build momentum and generate the additional support needed to strengthen and expand a city's energy efficiency program. The key with these programs is the element of choice. Because businesses must make the active choice to participate, those who do take part receive community praise as leaders in both the industry and local sustainability, fueling more businesses to join.

7.6. Setting Meaningful Targets

Before developing goals and working toward them, it's important that decision makers consider what makes for a good target. To be effective, a target should quantify the desired energy reduction, specify a baseline or starting point, include a clear timeframe, and identify the main actors. All targets should be clearly stated so that progress towards the target can be easily tracked and communicated, and those responsible for achieving them can be held accountable. Furthermore, targets should be based on the best data regarding what is realistically achievable for local businesses and organizations, and be directly aligned with incentives to spur action.

Self-Check - 7	Written Test

Choose the best option & circle the letter of your choice.

N°	Questions
1	Before developing goals and working toward them, it's important that decision makers consider what makes is called ----------. A. Inspiring the Private Sector through Voluntary Targets B. Setting Meaningful Targets C. Public Sector Targets D. All
2	To stimulate energy efficiency in the private sector, governments can introduce voluntary targets, incentivizing them to take action. A. Inspiring the Private Sector through Voluntary Targets B. Setting Meaningful Targets C. Public Sector Targets D. All
3	Setting targets to improve the energy efficiency of a city government's assets such as office buildings, public lighting, schools and hospitals sends a clear message that energy efficiency is something the city values. A. Inspiring the Private Sector through Voluntary Targets B. Setting Meaningful Targets C. Public Sector Targets D. All
4	As they have spread around the world over the last two to three decades, renewable energy targets have shifted geographically and have become highly diverse, both in the scope of the energy sources/technologies. A. Inspiring the Private Sector through Voluntary Targets B. Setting Meaningful Targets C. Public Sector Targets D. All

Satisfactory	3 points
Unsatisfactory	Below 3 points

Information Sheet 8	Promoting successful strategies are rewarding participants

8.1. Introduction

This Information Sheet Reward strategy involves designing and implementing reward policies and practices which are most likely to support your organisations objectives, delivering a motivated and effective workforce. A pay and reward strategy is something the CIPD recommend employers undertake.

8.2. Best Practice for Employee Recognition Culture

Your employees are your company's most valuable resource, but many organizations still struggle to retain top talent. Some of the best practices for recognizing employees include:

- Establishing solid criteria for work performance
- Recognizing people from all areas of operations
- Fostering a recognition culture where informal feedback is frequently offered
- Aligning performance benchmarks with the company's goals, culture and succession strategy
- Providing opportunities for advanced training and career development as part of staff recognition

The following 10 specific recognition culture strategies are effective ways to recognize and reward your employees:

i. **Make it personal**

It's critical to be specific, personal and accurate. Use positive words, and demonstrate to the employee that you actually understand their accomplishments.

ii. **Provide opportunities**

Some workers don't get the chance to excel because of the nature of their jobs or reduced expectations for certain types of work. Employees who do their jobs well should be able to earn opportunities for expanded responsibilities and training for job advancement.

iii. **Magnify recognition**

While verbal communication is clearly the most effective way to recognize employees, the best strategy is to back it up by publicizing employee accomplishments across multiple forums such as company newsletters, dashboards and in team meetings.

iv. Offer beyond-the-call-of-duty perks

Employees who consistently perform at the highest levels might earn special privileges. These might include such things as a better parking space or paid time off

v. Motivate with financial incentives

Although financial incentives aren't always the best motivators, they can certainly demonstrate appreciation for work well-performed. The best financial incentives are more open-ended and unpredictable because they motivate people to work their best at all times.

vi. Give holiday rewards and bonuses

The best practices for awarding holiday bonuses include offering a standard bonus or gift package and rewarding people for outstanding performance with special awards, extra cash bonuses, holiday gifts or recognition for yearly performance.

vii. Facilitate peer-to-peer recognition

Employees often prefer recognition from their peers than acknowledgement at the office, so many companies implement peer-to-peer recognition programs to engage millennial and the new generation of flexible workers.

viii. Recognize people's passions

Workers love to be recognized for their outside activities, hobbies and passions because it prevents people from feeling as if they're just cogs in the business machine. Passions can also work as rewards in their own right.

ix. Embrace gamification

Gamification strategies can be used in various ways to reward and motivate your employees to reach higher performance standards. A rotating trophy or plaque can generate enthusiasm

that's exceeds the investment. Of course, the more impressive the trophy, the more likely it will generate friendly competition.

x. Use technology and social media to publicize accomplishments

People don't live in a vacuum in today's environment of instant communications, so it's important to publicize important accomplishments and even human interest items in the company's social media forums.

8.3. Employee recognition: an insight

There is absolutely no one in the world who doesn't like being rewarded and recognized for the hard work they do and the same holds true for employees of your workplace as well. Employee recognition is the acknowledgment of an employee's efforts, hard work and behavior at the workplace that have contributed to the organization's success and objectives in some way. Both things are very important: recognizing and acknowledging these efforts, as well as rewarding employees for their fruitful efforts. Here are some ways in which you as an employer or business owner can recognize the efforts of your workplace and reward them accordingly:

- **Day-to-day recognition**

It is important to motivate and encourage employees to perform well on an everyday basis and not just on a periodic level. For example, small words of praise, little words of encouragement and constant motivation are highly important to make your employees feel encouraged for their efforts and to maintain a positive flow of the workplace environment.

- **Informal recognition**

Informal recognition is the kind of recognition which includes gestures of encouragement and appreciation. A pat on the back or a word of praise in front of the team can go a long way in boosting the morale of the employees.

- **Formal recognition**

Formal recognition is usually in the form of rewards for service, contribution, and achievements. These recognition forms also include events held for the celebration of achievements. Formal recognition often has some legal and policy requirements.

8.4. Types of Employee Recognition and Rewards

Recognition and rewards will vary from organization to organization, and how you appreciate employees will depend on your unique company needs. Your team could be motivated by a company-sponsored outing, a thoughtful email, or a gift card to their favorite store. It's up to you to understand how to most meaningfully appreciate your team members and with what rewards.

- **Bonuses**

There are many types of bonuses, ranging from small to large.

Small bonuses, sometimes called spot bonuses because they're given "on the spot," are small monetary rewards given frequently by one colleague to another in recognition of a valuable contribution. Although small bonuses can be given by managers to their direct reports, they can also be given by other colleagues and even from a direct report to a manager.

- **Written praise**

Writing thank-you notes can not only show appreciation, but is tangible proof of an employee's contributions. Written praise is a flexible method of recognition and notes of praise are almost universally appreciated, whether written or sent as electronic communication.

- **Verbal praise**

Verbal praise is perhaps the oldest and longest-standing form of peer-to-peer recognition in the workplace. Verbal praise is given by colleagues, generally in an ad-hoc fashion, in recognition of a staff member's valuable contribution.

Self-Check - 8	Written Test

Match the components in column A to their respective power plants in column B

Questions	
A	**B**
1. peer-to-peer recognition in the workplace 2. tangible proof of an employee's contributions 3. Monetary rewards given frequently by one colleague recognition of a valuable contribution. 4. Rewards for service, contribution, and achievements.	A. Written praise B. Bonuses C. Verbal praise D. Formal recognition

Satisfactory	3 points
Unsatisfactory	Below 3 points