OFF GRID LIVING BIBLE

The Ultimate Beginners Guide to Become Fully Self Sufficient in 7 Steps

Bradley Stone

OFF-GRID LIVING BIBLE:

THE ULTIMATE BEGINNERS GUIDE TO BECOME FULLY SELF-SUFFICIENT IN 7 STEPS

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CONTENTS

Introduction

1. Is Off-Grid Living The Best Choice for You?
2. Finding the Best Off-Grid Location
3. Types of Sustainable Off-Grid Water Systems to Consider
4. Sustainable Energy Options for Off-grid Living
5. Nutrition and Feeding Yourself While Off-Griding
6. Heating and Cooling Your Off-Grid Space Efficiently
7. The Best Waste Management Practices Off-Grid

Final Words
References

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INTRODUCTION

> ***“Going back to a simpler life is not a step backward.”***
>
> — YVON CHOUINARD

Surrounding yourself with nature has been proven to boost productivity, creativity, cognitive function and positively impact our health overall.

In this day and age where we are super attached to technology and modern conveniences, it is hard for many people to tear away from the life-sucking, fast pace of urban areas to enjoy nature.

Of course, some make up for life in the concrete jungle by having flowers and plants in their apartments or offices. However, that doesn’t make up for the lack of nature in our surroundings.

The living off the grid movement was triggered by a San Diego journalist by the name of Richard Louv. Louv wrote a book titled “Last Child in the Woods,” in which he talks about how nature-deficiency in children directly contributes to the disturbing childhood trends the world is experiencing. These trends include attention deficit disorders, obesity, and depression in minors.

The 2005 book largely created an awareness that the absence of nature in kids' lives was impacting them negatively.

According to estimates by the Conservation Institute, more than 1.7 billion people live off the grid. In the United States, Home Power magazine placed the number of American families living off the grid to be 180,000 and counting in 2013.

A growing body of research suggests that living in nature can lower stress and blood pressure, enhance your immune function, reduce anxiety and boost your mood and self-esteem.

Living off the grid and away from the constant anxiety caused by overstimulation in negative news cycles, the bombardment of calls and text messages, and the stress of traffic and commutes can eliminate the direct causes of health conditions like anxiety and high blood pressure.

This book will look at how to make the transition into off the grid living, including:

- How to know if it is the right move for you
- What to expect when living off the grid
- How to identify the right location for your needs
- How to source for food, power, water, and other essentials
- The right mindset to have to live off the grid

You are not alone in finding the rigors of urban living overwhelming.

Famous singer John Mayer opts to live on a farm in Montana instead of cramming himself into the Hollywood facade. And he is not alone. Bruce Willis has a ranch in Idaho to escape from prying eyes that come with his job, and Micheal Keaton has a ranch in Montana to allow him to fish, hike, and canoe.

Tina Turner lives near Lake Zurich in Switzerland, while Woody Harrelson, the actor/environmentalist, prefers to make Maui in Hawaii his home.

You are in great company if you are thinking along the same lines as some of these greats. Although, to be fair, they are not living the roughing-it version of off-grid living.

It is hard to determine where the best place is for you to live off the grid and whether you should completely go off the grid or rely on some services.

Use this book as a resource to let you know where you can find the best off-the-grid living community in the United States and other places outside the US. It will also help you determine which type of off-grid is best for you.

This book will walk you through all you need to know about moving to an off-grid area. It will show the challenges without glossing over them because this is a life-changing move.

Nonetheless, the benefits are numerous and life-giving/affirming compared with the rat race of city life.

As David Russel aptly puts it,

> *"Sometimes the hardest thing in life is to know which bridge to cross and which to burn."*
>
> — DAVID RUSSEL

The fear of walking away from urban living is real. But, the truth is that it is more natural for us to be surrounded by wilderness and nature than to be surrounded by concrete, pollution, and processed foods.

Let this book be a step-by-step guide to cross over to health and natural wealth.

Let's get into it!

1

IS OFF-GRID LIVING THE BEST CHOICE FOR YOU?

> ***"Building an off-the-grid home is one of the hardest but also one of the most rewarding things you will ever do."***
>
> — GARY COLLINS, AUTHOR OF GOING OFF THE GRID: THE HOW-TO BOOK OF SIMPLE LIVING AND HAPPINESS

It may sound novel and even romantic to think of living in nature and away from the congestion of most cities.

The truth is that you are not the first person to romanticize the idea of living off the grid. But you must approach this lifestyle change with the full scope of the advantages and disadvantages.

This chapter will explore what living off the grid is and outline what to expect so that you make an informed decision.

What is Off-Grid Living

Off-Grid living means living a sustainable life while operating independently of the organized electrical power, water, and sewerage grids.

Self-reliance goes beyond creating your utilities. You also have to:

- Home-school your kids.
- Grow your food and rear animals for consumption.
- Know how to attend to minor medical needs.

When you live off-grid, you are autonomous; therefore, you do not depend on the municipal sewer systems, water, natural gas, or power.

That is the official meaning of off-grid living. But the good news is that you can decide your interpretation of living off the grid.

Here are the three options for living off the grid:

a) Roughing It

Roughing it is off-grid living where you ***completely*** go off the grid. That means that you do not rely on any of the government utilities at all.

You have your source of water, a septic tank for waste, and a renewable source of power like solar or wind. You may even choose to go without electricity entirely.

You may have to build a dry shelter, meaning it has no running water, electricity, or plumbing. You will have an outhouse for toilet use, a river, well or borehole for water, and a garden for growing your food.

Roughing-it usually means starting with a small cabin and creating a homestead to sustain the family's needs.

Your ability to refrigerate food is limited, so you only have to prepare what you can eat at a time. This type of off-grid living is popular with survivalists.

Roughing it is the extreme version of off-grid living, and you have to be ready to overcome these challenges.

Advantages of Roughing it Off-Grid Living

1. You wholly reduce your expense.
2. It is an environmentally friendly option.
3. You learn how to survive using nature as a daily resource.

Disadvantages of Roughing it Off-Grid Living

1. You are entirely cut off from all amenities.

2. It takes time to become completely self-reliant to enjoy roughing it.

b) Half Off/Half On the Grid

There is the option ***not to go entirely off the grid***. Instead, you can ***rely on the modern infrastructure for some of the essential services you need to run your home.***

However, the reliance is not as heavy as it would be if you were in the city.

For example, you could use the municipal sewer system for sewerage needs but pump water from the borehole for bathing and cooking needs.

The combination of half-on-half off-grid living is entirely up to you and your needs. The point is that you will have moderate reliance on the government utilities in your area.

Advantages of Half On/Half Off-grid Living

1. You live more comfortably than roughing it.
2. Your expenses are still minimal compared to city living.
3. It allows you to test the waters of off-grid living before committing fully with your family.

Disadvantages of Half on/Half Off-grid Living

1. You are still reliant on municipal systems.

c) Modern Off-Grid Living

This is by far the most popular form of off-grid living. ***You still have almost all the trappings of a modern lifestyle, but you choose only to use them to stay self-sufficient.***

Modern Off-Grid Living means your home has a way to harness electric power with generators, solar panels, or wind/water power. You will also have a pump to harness water from the underground water table.

Your home also needs a septic tank and pump to remove the waste from your home to the tank. That allows you to run your bathroom and kitchen the same way you would if you were reliant on municipal utilities.

The running water, electricity, and waste disposal systems that you put in place to live a modern off-grid lifestyle also allow you to use modern appliances.

You may still choose to grow your own food, rear animals, and make your own washing and hygiene products.

Advantages of Modern Off-Grid Living:

1. You still maintain the same lifestyle despite going off the grid.
2. It is cheaper than living off municipal utilities.

Disadvantages of Modern Off-Grid Living:

1. It is expensive to put in place all the amenities to keep you completely off the grid.

How Do I Know Off-Grid Living is For Me?

It may be a good idea to try out the off-grid lifestyle if you are yearning for the following things:

Simplicity in Your life

How simple you want your life to be is dependent on what you would like. For example, simplicity for you may mean no more traffic jams and the hurried pace of life that comes with city living.

With the hustle and bustle of the city far away, you can enjoy the simple things in life like long walks/hikes, a peaceful day without constant and stressful text messages and calls, or more time with your loved ones.

Eliminating Reliance on State-Provided Resources

Over-reliance on state-provided resources can leave you vulnerable if any of these resources are not available for one reason or another.

For example, if there is a state-wide power blackout, you, along with the thousands of other citizens, are left with no way to cook, cool, or heat your home or even power critical devices and appliances in the home.

However, off the grid, you have your own power source from reliable renewable sources like solar, water, and wind. Your daily processes are not affected.

The coronavirus showed the world how easy it is to go from having plenty to being cloistered and unable to access even the essentials. Still, when you are allowed to go shopping, basics are missing from supermarket shops because manufacturers cannot produce enough necessary items.

Chicken and meat plants were shut down due to workers coming down with Covid-19 and that led to less production of these meats for urban dwellers.

However, those people living off the grid found that their food supply was not affected in any way. They were still able to have enough to eat and even a surplus despite the pandemic bearing down on the entire world.

This self-reliance gives you security allowing you to enjoy your life regardless of where you are living.

A Natural and Healthier Quality of Life

Many people are attracted to off-grid living by the idea of growing their own food and rearing animals for their consumption.

Which allows you to move away from processed foods and also to be sure of the quality of the food you are consuming. Unfortunately, you cannot ascertain the source and quality of food on grocery store shelves.

Homesteading ensures you eat fresh, high-quality food at every meal.

To Cut Down the Cost of Living

Living off the grid is very economical because you spend little to nothing paying bills or buying food.

The initial cost of setting up a self-reliant homestead may be quite high because you have to get your source of power, water, and cooking going.

That requires capital to buy solar panels, dig the well or borehole and set up a septic tank.

But once the home is set up, your costs go down to almost nothing.

According to the website USNews.com, states like Indiana, Michigan, Missouri, Tennessee, Oklahoma, and Ohio, among others, are the cheapest states in the country.

But even in affordable places like this, life can be expensive. For example, the price of an average four-bedroom house in Ohio could be a little over $260,000. It seems like a steal compared to Atlanta, where a similar house could be as much as $1.2 million.

However, if you opt to build your house off-grid and homestead, you can eliminate that $260,000.

Living off the grid guarantees low costs and little to no surprise expenses.

Conserving the Environment

Off-grid living is excellent for the planet because you draw less from the environment and give back more. Off-grid homes, especially the tiny home trend, consume little energy, and you also end up living a minimalist lifestyle.

You do not need to use coal, petroleum, or natural gas, which reduces your carbon footprint in your environment.

You also do not take more than you need. For example, without a refrigerator, you only need to catch fish to eat at one meal.

How Do I Test Off-Grid Living?

If you are still on the fence about this lifestyle, it is a good idea to begin by going on vacation at off-grid Airbnb spots.

There are plenty of homestead rentals available on Airbnb. These rentals allow you to experience off-grid living without committing to the lifestyle just yet.

It is an excellent way to see which type of off-grid living is good for you: Roughing it, half on/half off, or modern off-grid living.

I recommend trying out all three. You can rough it in an isolated cabin in the woods, and then try the half-on/half-off experience and finally the high-tech off-grid home.

The point of this exercise is to enable you to meet the off-grid living experience where you are most comfortable.

If after you have experienced the off-grid living vacation and decided which one you best prefer, it is time to reframe your mindset and attitude.

The Take-Away

- Off-grid living means you either do not use state utilities or limit your use of said utilities.
- There are three ways to enjoy off-grid living: Roughing it, half-on/half-off grid living, and modern off-grid living.
- Write down the type of off-grid you would like.
- Test out each of the three off-grid lifestyles before making the big move.

2

FINDING THE BEST OFF-GRID LOCATION

“When you leave your old neighborhood, the city streets and business will almost instantly fade from your mind. The chirping of birds will replace the yelling of people.”

— NORM GEDDIS, OFF THE GRID FINANCED LAND ONLINE: THE ULTIMATE GUIDE TO SELLER FINANCED LAND OWNERSHIP FOR HOMES, CABINS, HUNTING, AND INVESTMENT

How to Choose the Ideal Off-Grid Living Location

Since off-grid living involves relying on the land, the ideal location should have the following essential resources to ensure you survive and thrive.

Water

It is impossible to survive anywhere without water. Water is life. This may sound like common sense, but you may find yourself swayed by the low cost of the land, outstanding scenery, or other perks of the land that you overlook the inaccessibility of water.

There are arid places in the country where the land may be cheaper, but you have to haul water for miles to your property.

And the cost of getting water onto your property under such circumstances is astronomical.

Think of it like this: You may have to leave your home to go and find water. Sometimes for days and your home is in a remote area. Speaking from a security point of view, you leave the rest of your family vulnerable and without your protection. If you take the vehicle to get water, they have no way to move around.

Hauling water is not sustainable, and you are at risk of unsanitary conditions, disease, and dehydration.

The location you choose needs to be close to a water source, and it should be easy for you to get the water to your property. But more than that, make sure that you have a water storage tank and filtration system on the property as well. That ensures that your water is safe to consume in the home.

Climate

Choose the climate wisely, ensuring it is weather that you can weather (pun intended), even at its worst.

Several things go into choosing the ideal climate for you. They include:

- Source of renewable energy
- Health
- Safety
- Accessibility

Choose a climate that supports the type of renewable energy you intend to harness. For example, if you are keen on using solar energy, make sure your location offers plenty of sunshine for the better part of the year.

If you prefer hydropower, it is best to have a sustainable water source nearby. And if you want to use a windmill, ensure your location experiences strong enough winds to support the turbines.

It is also crucial to ensure that the climate doesn't affect your or your family’s health. Very cold areas carry a risk of hypothermia. If you keep your livestock outdoors, you could lose the animals to cold weather.

In humans, cold weather has been linked to an increased risk of a heart attack. You are not immune to hypothermia either, especially if your heating system has a problem.

You also need to choose areas with a safe climate. For example, living off-grid in a location prone to hurricanes, flash floods, and tornadoes puts your life at risk.

Finally, ensure the location is accessible even in the worst weather. Some off-grid places experience landslides, cutting off the roads and rendering it impossible to leave or enter the area. That means you are trapped without a safe way out.

Building Materials

Living off the grid means you have to build a house to live in. Strive to find a location where you can access natural building materials to build the type of home you would like.

It is very costly to bring in other materials from elsewhere for the building.

So pick an area where construction is going to be cheaper. Depending on your preferred building material, consider a location that has:

Wood

Wood is necessary for all types of construction. Buying it from a lumberyard or a big box store is very costly. So, ensure that your chosen location has access to a wooded area nearby that can be a source of cheap lumber for building.

Earth

Constructing using earth is a technique as old as time itself. It is a building technique that uses earth, limestone, chalk, and gravel. Building using earth has lived through history, and in this case, you will use a mixture of different aggregates.

Did you know that rammed earth is found in many luxury homes because it is an excellent thermal material? It allows the sun to warm it in the day and releases the warmth slowly in the evening.

It is cheap to access the materials that go into rammed earth when you live near them. This low carbon technique requires the earth materials to be placed in layers together with a binder. The layers are then applied using pressure into a durable, hard surface.

Some people also use the same concept to create building blocks from waste materials derived from quarries.

Straw Bale

Straw bales have become popular once again in the west after being used centuries ago. For example, 400 years ago, many houses in Europe either featured a straw-thatched roof, or the entire house was straw bales. Even when European settlers first came to America, they would put straw on the teepees to insulate the tents from the cold, especially in the cold season.

In this age, straw bales provide excellent load-bearing structural support to buildings, and they can be used simultaneously with other natural building materials like wood.

Not only is straw cheap and available, but it is also an excellent insulation material because it makes the walls thicker. And the straw bales can be made fire-resistant making them an excellent substitute for wood.

Strawbale buildings are warmer in the cold months and cool in the hot months.

A big part of off-grid living is building a sustainable, eco-friendly home using natural building materials, including the ones mentioned above.

You will notice all the materials mentioned above were used centuries ago when human beings existed in tandem with nature and wilderness. They thrived, were safe and comfortable in homes built with these materials.

But you can have a modern twist if you do not want to use natural materials. For example,

Container Home

You can use a shipping container and have it refitted to create a wonderful home for you.

A container home is an instant solution, and there is little to no labor in the building from your end. You can place it anywhere on your land, and it will be immediately usable.

It can also be an option to use as you prepare to build an eco-friendly structure using natural materials. If you are relocating to an off-grid location with many containers, you may find the best way to conserve the environment is by recycling the shipping containers.

There are different types of containers ranging from grade A to grade D. For a safe and eco-friendly option, opt for grades A and B.

Access to Roads

Just because you live off the grid doesn't mean that you should become absolutely inaccessible. Ensuring that the place you choose has access to roads means that if you have an emergency, you can reach a hospital, police station, or fire station quickly.

Also, if your car has a problem, help can reach you easily.

Before delving into the best states to live off the grid, here is a quick look at the legality of living off-grid in the United States:

It is technically utterly legal in all the 50 states in America. But legal problems can arise when you try to install a septic tank that doesn’t pass the health department inspection. Or if you decided to put a composting commode in your home that doesn’t pass the building code.

However, there is a silver lining. If you do everything according to the book, pass health inspections and build your home and infrastructure according to the International Residential Code, then you will not have any problems with the law.

Here are some of the laws and restrictions you must be prepared for when considering off-grid living:

- Rainwater collections laws.
- Laws regarding complete disconnection from the electricity grid.
- Solar energy laws and regulations.

- Composting toilet laws and codes.

1. Rainwater Collection Laws

Rainwater collection codes stipulate that it is legal to collect rainwater in all 50 states (or most areas of the 50 states) if you are on private property.

However, setting up a rainwater collection barrel system is not legal. Such a system may be a violation of the local or state ordinances in the area. You may need to get a permit to engage in such an activity.

Before you settle on a location, it is crucial to determine the rainwater collection laws. Some states have simple laws, while others have a lot of exclusions.

2. Composting Toilet Codes

All the states have stringent rules and ordinances governing the disposal of raw sewage. These codes are found on the state or municipality websites, and they offer guidelines on septic tanks and sewage disposal.

Some states may allow a composting commode while at the same time being against an off-the-grid septic system. That is because the American building codes require that your living situation should feature a flush toilet that drains to a government-approved sewer or septic system.

But there is some good news regarding composting toilets for off-grid living families. An Oregon activist group by the name of ReCode worked hard to legalize sustainable sanitation systems all around the country. They drafted the code with the help of composting commode experts in the US. This code is now part of the 2017 Water Efficiency Standard.

That may prove helpful when it comes to composting toilets.

3. Solar Energy Laws and Regulations and Disconnecting from the Electrical Grid

You can legally install solar energy panels on your home and not have to use power from the state-provided electrical grid. In some states, you can utilize solar energy without needing a permit.

However, some states require you to have a permit before you can go completely solar. Some have rules about the placement of solar panels.

In other states, you may have no choice but to remain on the main electrical grid and pay a small connection fee even if you are primarily using solar energy. These laws may be in line with building codes, and they are more common if you are trying to live off the grid in an urban or suburban municipality.

But here is some good news:

If you harness more energy than you need, you can sell it back to electrical power companies for a tidy sum.

If you go to rural areas where building codes do not have an effect, you are less likely to run into stringent laws and ordinances regarding using solar energy.

You can find out if you can disengage from the municipal power grid in your area by checking whether the International Property Maintenance Code applies in your municipality. If it does, review the building codes for the state and the municipality. But if not, you have no hindrance to using solar energy undisturbed.

Additional rules and laws to consider include:

- How to build permanent homes because using a mobile home or a tent is against the law resulting in eviction and fines.
- The size of your house must be built to state size specifications.
- Restrictions on selling raw milk from your homestead.
- Restrictions that may arise about livestock.
- Disposing or use of composting toilet waste.

These laws, rules, and ordinances vary from one state to another. For example, in Alabama, the state considers harvesting rainwater to be a property right. This state even offers technical instructions and guidelines to help residents safely and sustainably collect water off-grid.

On the other hand, the state of Georgia has laws that highly regulate rainwater collection. It also stipulates that any collected rainwater must be used outdoors only.

That brings us to the best states for off-grid living with all the above laws and legal issues considered.

Keep in mind that there are laws that prohibit you from off-grid living in urban or suburban areas.

You cannot live off the grid in these areas, so it is crucial to find the ideal location for off-grid living. Living off the grid is better to pursue in the countryside. So, it is best to look for a state that has a rural county.

Rural counties tend not to have zoning laws, and you can get away with installing infrastructure like solar panels or windmills without interfering with government machinery.

Best States for Off-Grid Living

The top ten states for off-grid living are in the following order:

1. Alabama
2. Missouri
3. Georgia
4. Tennessee
5. Texas
6. Louisiana
7. Indiana
8. Hawaii
9. Colorado
10. Arkansas

These states are the creme-del-a-creme of off-grid living because they offer the most freedom to live off the grid. The cost of living is low, the lifestyle is sustainable, and they have an excellent off-grid living community, among other considerations.

They also are excellent and sustainable for agriculture, energy, and water.

The cheapest states are:

1. New Mexico
2. Louisiana
3. Alabama
4. Mississippi
5. Wyoming
6. Arkansas
7. Oklahoma
8. Arizona
9. Utah
10. South Carolina

From the property taxes to the cost of land, purchasing and maintaining land in these states is more affordable than in other states. That means that beginning the journey to off-grid living in these states may be more accessible if you are on a budget.

You may also find that shopping for food and other costs of living issues are more affordable in these states.

The following states have more freedom for off-grid lovers, including allowing you to build without adhering to a building code. They include:

1. Alabama
2. Tennessee
3. Georgia
4. Missouri
5. Indiana
6. Maine
7. Texas
8. Wyoming
9. Colorado
10. Idaho
11. Montana
12. Nevada
13. Alaska

Most of the counties in these states allow you to build a structure without a building code. That means you have the freedom to create a septic tank, composite commode, and get off the power grid entirely.

Some of these states, like Alabama, Tennessee, and Georgia, allow “riparian water rights,” meaning they allocate you water if the river passes through your land. In other states, they offer you a “hybrid solution” so that you have several sources of water.

Finally, other states accept the prior “appropriation of water rights,” which means that the first person to divert or use water for beneficial use can get full rights to that water.

If you purchase a new piece of land with a river running through it, you have rights to the river and its waters.

These states are excellent options if you want to build a tiny house, an off-grid cabin, a container home, or embark on natural building using materials like straw bale and others.

Here are states that have exceptional off-grid water access if you want to live in an area where you can not only harvest rainwater but also enjoy water sports or income-generating water activities:

1. Hawaii
2. Mississippi
3. Alabama
4. Louisiana
5. Florida
6. Kentucky
7. Tennessee
8. Connecticut
9. North Carolina
10. Arkansas

In these states, it is legal to harvest off-grid water, and some even go further and make it an unrestricted activity.

With no legislation curtailing water harvesting efforts, you can do a lot with rainwater and underground water as well.

If you are looking for states that permit off-grid agricultural productivity, here are the top ten to consider.

1. Florida
2. Louisiana
3. Hawaii
4. Alabama
5. Texas
6. Georgia
7. Missouri
8. Arizona
9. South Carolina

The climate in these states is warm with a lot of Growing Degree Days (GDD). GDD refers to the number of days that support the growth and development of plants during the growing season.

The more the GDD, the larger the period within a year you have to grow plants and the bigger your harvest. If you have large acres of land, the more GDD you have, the more food you produce per acre.

These are the states with the most off-grid power potential. If you choose one of these states, you can enjoy uninterrupted solar or wind power because of the availability of wind or sun for most of the year.

1. Colorado
2. Kansas
3. Nebraska
4. Hawaii
5. South Dakota
6. North Dakota
7. Oklahoma
8. New Mexico
9. Texas
10. Wyoming

You can take advantage of the natural sources of energy and live fully off the power grid, especially in states that allow the unrestricted use of sustainable energy.

Finally, you may be looking for a state where there is a large off-grid living community. Here are some considerations to look at. After all, off the grid is not an excuse to be isolated:

1. California
2. Oregon
3. North Carolina
4. Virginia
5. Missouri
6. New Mexico
7. Washington
8. Colorado
9. New Hampshire
10. New York

It may be harder to live off-grid in places like New Jersey, Illinois, Massachusetts, and Rhode Island, among others.

Off-grid living can become illegal in all the 50 states if you do the following:

a) Squat On Someone else's Land

If you plan to live off the grid, you must purchase the piece of land you intend to live off. It is illegal to squat in abandoned buildings or live off any land that may seem unclaimed.

The police have a mandate to remove you physically from the land where you may be squatting. It is not trampling on your freedom when the police evicts you.

You cannot build a home and infrastructure on land that doesn't belong to you only to have it torn down because you were squatting.

b) If You Disregard Building Codes or Zoning Restrictions

Zoning restrictions and building codes are not suggestions that you can choose not to abide by. If they are in place, it is mandatory to follow them to the latter to stay on the right side of the law.

Check out these codes and restrictions and ensure that any structure you build on your property is in line with them.

For example, it is illegal to dump sewage anywhere except the designated areas. Building codes stipulate what types of toilets you should have (flushing toilets) and how they should be built.

c) Fail to Pay Your Taxes

Even when you live off the grid, you still have to pay your taxes. Paying taxes is mandatory for all law-abiding citizens. If you have property, you must pay property tax regardless of how remotely placed your lot is. Find out the taxes applicable to your property from the state you are in.

The taxes also apply to livestock keeping, crop production, craft-making, and any income-generating services you may render locally. All income is taxable by the government.

The IRS is still watching you, even as you live off the grid.

Best Places to Live Off the Grid Outside the United States

Australia

Australia is a survivalist paradise. There is a lot of outback that can accommodate off-grid living; This is one of the places where you can completely get off the national energy grid.

However, there are laws and regulations concerning off-grid living in Australia. Each town and country has permits that control zoning and housing. If you do not want to deal with tedious zoning rules and permits, you can opt to go wholly remote, but that means you are away from schools, hospitals, and other critical infrastructure. Areas that do not have zoning rules and permits tend to be very remote and secluded.

Also, you need to purchase land for your home and get the relevant building permits from the local council. For example, one of the building requirements, if you intend to live off the grid in Australia, is that you must install high-volume batteries to store electricity from your solar systems.

This is one of the numerous standards and regulations governing off-grid power installations.

Some states in Australia have embraced off-grid living more than others. They include Queensland and New South Wales, among others.

The good news is that you can receive rebates and incentives from the Australian government for choosing to adopt off-grid living. Such incentives help to mitigate the initial cost of setting yourself up for off-grid living.

United Kingdom

The United Kingdom has some of the best country-sides in Europe: Picturesque, peaceful, and self-sustaining. It is legal to live off the grid in the United Kingdom.

But, be prepared because some local authorities may have special rules that apply to places of natural beauty within the locale. If your off-grid living interferes with such places, you may find yourself on the wrong side of the law.

If you are considering off-grid living in the United Kingdom, you must get planning permissions for the following building scenarios:

- If you intend to change the use of the building.
- If you intend to build something entirely new.
- If you need to make massive renovations.

For people that want to dig a borehole, they must carry out a geological survey to ensure the process is safe and sustainable for you and the environment.

Canada

Depending on the state you are considering, you must look out for local building codes, which vary from one place to another.

If you are building any house off the grid, you must have smoke detectors and ventilation, among other things. For example, you may be interested in leaving no carbon footprint; however you may not be able to achieve that because the building codes require appliances and devices that leave a high carbon footprint.

Canadian law doesn't recognize squatter rights, and their postal service doesn't play the off-grid seeking game. If you are off the grid, you have to find a way to receive your parcels or online purchases.

All companies need a legal street address which may be a challenge for purist off-gridders in Canada.

You also have to be prepared for property taxes and income taxes. You will find a lot of similarities in off-grid living laws and ordinances between the United States and Canada.

Polynesia

Polynesia encompasses the Hawaiian Islands, New Zealand, Samoa, Tonga, Cook Islands, and Tahiti, among other islands.

You can grow your own food, fish, catch other seafood and build using natural materials; because of the frequency of rain, rainwater collection is commonplace. Plus, Polynesian islands remain some of the most undisturbed areas of the world, so activities like fishing and hunting are not only feasible but sustainable as well.

Some islands may have more stringent building regulations compared to others. You also need to research and educate yourself on any conservation efforts on your island of choice.

Europe

Italy is a great country that sustains off-grid living in places like Abbruzzo and Torri Superiore. You can also enjoy the off-grid lifestyle in France in areas like the Mid-Pyrenees and Hameau des Buis. In Denmark and the

Netherlands, you have options like Fertile Soils and Amsterdam, respectively.

Sweden has Suderbyn and Kolarbyn Eco-lodge, which feature island and mountainous lifestyles, while rural Romania is all about off-grid agricultural living. Scotland has several regions like the Findhorn Eco Village, while Northern Ireland has Leitrim. Inhabitants of both places are interested in reducing their carbon footprint. For example, people living in Findhorn Eco Village build their properties using recycled whiskey barrels.

Spain and Portugal also have excellent off-grid living regions Arterra Bizimodu and Tamera in that order.

If you want remote living, you have the option of Scoraig in Scotland, where residents live off the land and use wind turbines for power; This is similar to Tinker's bubble in England, which is a well-established off-grid community. Residents use solar panels and wind turbines, and no fossil fuels are allowed.

At Tinker's Bubble, you will find people are self-sufficient by developing tools and implements to build their houses and other vessels.

If you want to live off-grid and away from national utilities but still retain the modern off-grid living model, you can opt for Matavenero. Matavenero was once a ghost town that has been repopulated by off-grid enthusiasts, who have built amenities like a library, free school, bar, bakery.; They even have a community social media account.

You must put a lot of thought into the reasons for transitioning to off-grid living.

Five main reasons cut across the board for many people making this move. They determine the location they choose. They are:

To Live a Sustainable Life

If you want to be near nature and live a natural life where you sustain all aspects of your existence, then roughing it may be the best option for you.

That means you are not reliant on state-provided utility systems, and you find ways to survive in nature.

In this case, you can live in a remote area even with forest cover. But, it is essential to ensure that you are near a water source. That could be a river or the underground water table.

Look for a location that takes you away from the sheltered life you are used to and provides an environment where you can thrive off nature. Ensure that it enables you to build your survival skills, and you are safe doing so.

To Enjoy a Stress-free Lifestyle

In this case, the location has to be removed from the stressful urban influences. You can opt for modern off-grid living where you are removed from the city, but you can still enjoy the comforts that you are used to.

Or you can opt for roughing it where you cut off contact with your previous lifestyle and opt to live a survivalist life.

In both cases, you need to look for a remote place or community.

Half-on/half-off grid living may not work because, if you are still plugged into any of the state-provided utilities, you have not broken free of the stressful bills at the end of every month.

To Lessen the Cost of Living

If you are moving off the grid, for this reason, you probably still want to retain some of the modern trappings but just at a lesser cost. You may be best served by a half-on/half-off grid living or modern off-grid living.

In both cases, you still have access to the modern utilities that you are used to, making the off-grid life more palatable.

If you opt for the half-on/half-off option, you can use limited municipal resources like sewerage only and figure out how to power your appliances using renewable energy. You have saved on the high electricity bills you would usually expect at the end of every month.

You may choose to remain on the state electric grid but build a septic tank for sewerage and dig a borehole for water. Even in this scenario, you have saved on the water and sewerage bills.

If you decide to adopt modern off-grid living, you need to rig your homestead with pumps for pumping water, waste, and solar panels/windmills for electrical energy. It may be expensive to put all these amenities in place but once installed, your cost of living goes to near zero while you enjoy the same modern living you are accustomed to.

You also have to make off-grid living choices more often. For example, if it is cloudy and wet, you learn to make do with little to no power as you conserve the solar energy until the sun re-emerges.

That means you cannot power large appliances like a washing machine, so you wash by hand. Or learn other food preservation methods like salting and drying because you cannot use the refrigerator.

If you are interested in half-on/half-off, you need to find a location within reach of the utilities you still want to continue using. That means you cannot go very remote.

However, if you are going for modern off-grid living or roughing it, you can afford to go remote since you will be completely self-reliant.

But in both cases, you need a place with plenty of water and sun to sustain your lifestyle.

To Preserve the Environment

If you are interested in keeping the planet safe and preserving the environment, roughing-it is the best option.

Roughing it requires no state-provided infrastructure. You will learn to survive and keep your carbon footprint low so that the environment doesn't suffer.

Overall, when choosing a location, consider practicality and quality over price.

> ***"The bitterness of poor quality is remembered long after the sweetness of a low price has faded from memory."***
>
> — ALDO GUCCI

The Take-Away

- Determine your needs to ascertain what is the best off-grid location for you and your family. For example, *do you still need access to schools, or do you want to homeschool? Does a member of your family have a pre-existing health condition? Are you interested in enjoying a modern social life, or do you want a complete disconnection from the urban social setting?*
- Consider your budget when it comes to building and standard of living. The quality of life in an off-grid setting can be determined by which state you choose. For instance, if you live off the grid in a remote county in Mississippi, your quality of life will be very different from if you were doing the same in Georgia or Florida.
- Research the climate to figure out what is the worst-case scenario climate-wise to expect. For example, you shouldn't choose to live off-grid in a remote place where tornadoes and hurricanes are common.
- Research local, state, and federal laws that apply to the off-grid location of your choice so that you always remain on the right side of the law. That requires staying up to date with lawful off-grid living practices.
- Refer to the list above for the best states and countries for off-grid living.

3

TYPES OF SUSTAINABLE OFF-GRID WATER SYSTEMS TO CONSIDER

> ***"What makes a desert beautiful is that somewhere it hides a well."***
>
> — ANTOINE DE SAINT

There are four main types of popular off-grid water systems that you can choose from. Unless you are living in a place with particular criteria for how you source your water.

The following options should work for any off-grid lifestyle:

1. WELLS AND BOREHOLES

Wells and boreholes are vertical holes that penetrate the aquifer to reach and exploit the water from the water table.

A borehole is usually machine-drilled with a small diameter, while a well is sunk by hands and has a larger diameter.

There is a reserve of water underneath the ground surface that is surrounded by rock, gravel, and soil. The water sits in the pore spaces of the gravel, rock, and soil. This water is from rain or melted snow, and it moves down into these spaces because of gravity. As more water seeps into the ground, the pore spaces become saturated, forming what we know as groundwater.

The water sits in aquifers which are geological formations of soil and rock.

Boring a borehole or digging a well allows you to reach said groundwater, and it becomes your source of water. The digging and boring releases water from the aquifers, and they fill the holes created. That means that even if you use up the water in the well or borehole, the water from the aquifers will keep filling up the well/borehole.

How deep you have to dig or drill the hole for your borehole or well depends on how deep or shallow the water table is. The shallower it is, the less digging you have to do, and the deeper it is, the more you have to do. In wet areas, the water table may be shallow and deeper in arid places.

In arid areas, it is not uncommon for the water table to be as low as 1000 feet off the ground surface.

Many modern wells feature a pipe or casing in the hole and grouting at the surface that prevents the water in the hole from getting contaminated by surface water.

Things to Look Out for When Considering A Well Or Borehole

i) Location

Ensure that the well/borehole is located in an area away from animals or farming implements. The wellhead should not be accessible to animals to avoid accidents like animals falling in or defecating near the well.

It should also not be too close to a road, but it must be close enough to the house to facilitate easy plumbing connections.

Unfortunately, when it comes to boreholes and wells, there is no guarantee that you will hit water. Nevertheless, there are well-drilling companies that can perform a water survey of your area and let you know if you can successfully get water from the water table. They may rely on water maps of your area that show how far the water table is.

The most reliable water map is from the United States Geological Survey (USGS), which shows where underground water aquifers are available countrywide.

ii) The Drilling Method

There are primarily two drilling methods:

- Hiring a drilling company.
- Water witching.

Hiring a drilling company is convenient because the company comes with all the equipment and the employees have the best expertise.

As mentioned, the company can conduct an onsite survey to find out where the water may lie. This is an expensive option because you may spend $350 to $700 to acquire a permit and up to $60 per foot for the drilling.

In addition, there is the cost of installing a filtration system, pumping and housing the pump, and the labor. You may be looking at a range of $6000 to $7000 just to drill a depth of 300 feet. Overall, you may find yourself looking at fees of over $10,000.

You need to apply for a permit from the building permits office before hiring a drilling company.

Water witching, on the other hand, is a do-it-yourself way of hunting down water aquifers. The practice is also known as dowsing. You take a Y-shaped piece of metal or twig and hold each end. The twig or piece of metal will twist towards the nearest underground water aquifer.

You can also use two separate rods of metal, and if you are standing on top of underground water, they cross over each other. But make sure that the rods are L-shaped and held loosely close to each other.

Now, keep in mind that this is not a scientific method, so no data is backing it up. But, many people swear by it, and it has been a go-to method for thousands of years before drilling companies came into the picture.

Some people opt to drill themselves without hiring a drilling company. This may work if the land doesn’t have any bedrock to drill through or very few rocks form a formidable obstacle.

If you decide to take this route, you will need to purchase some drilling equipment. Some kits are hand-turned, and some that you can put on a three-point hitch on your tractor.

However, remember that it is a laborious process to drill.

iii) Ensure the Water is Safe

Some water tables are contaminated, making the water unsafe for human consumption. Just because it is underground water doesn't mean it is safe.

You can tell the water is not safe if it has the scent of rotten garbage or eggs. That is an indicator that the water is probably contaminated by high sulfur content. Unfortunately, hydrogen Sulfide is formed within the ground, and it can make its way into the water table, contaminating the water.

Ensure that your water is tested to ascertain safety, including unseen metals like lead, arsenic, and mercury. These don't smell or taste bad, but they are deadly. Companies that test the water will offer the best filtration solutions

iv) Invest In a Pump and Sand Filter

The pump is essential to help you move the water from the depth it is to the house. Such pumps can be dropped through the casing in the well/borehole into the depths of the well. The pump will need to use power, so if you are not connected to the national power grid. It will require solar energy to work.

It may be a good idea to consider a dedicated solar panel for the sole purpose of running the pump when required. That means it doesn't power anything else in the homestead.

Before placing the pump, you must place a sand filter which looks like a screen at the bottom of the well. The sand screen prevents small rocks and sand from entering the pump and blocking it. Also, at the top of the well/borehole, you must install a well cap. This cap allows the pump's wiring to run safely down the depth of the hole while keeping the debris from rain runoff from entering your well/borehole.

The casing for your borehole/well must be at least 12 inches off the ground to meet the legal requirement for this structure.

It is not uncommon for people with boreholes and wells to utilize water pressure tanks. These tanks fill up with water and automatically cut off the

supply when full. However, when you open your faucet, the water pressure is more because the water is coming from the tank instead of the depths of the well.

Water pressure tanks come with an air diaphragm that creates the necessary pressure to push water out and into the faucet with the normal pressure you are used to.

2. SPRINGS

If your land is close to a natural spring or one is passing through it, that is an excellent water source. Water from natural springs is underground water that has seeped through the cracks and bubbled to the ground surface.

The good news is that springs can offer you a consistent supply of water, and they cost you nothing to draw to the surface. All you need to do is hook up some pipes and divert the water into a storage tank.

But natural springs are rare, and most affordable off-grid lots don’t have them. Also, there are higher chances that the natural springs may dry up or cease flowing depending on environmental factors.

Things to Look Out for When Considering Natural Springs

i) Animal Coverage

Animals can smell water much better than human beings. That means that they may lead you to a hidden water spring.

Look out for footprints or your animal digging the area. For example, if your dog constantly comes through the door with muddy paws and snout, you can follow it and see where it is getting the mud from. Once on the site, you can step on the ground and see if water seeps out of the ground and also look around to see if there are any animal footprints left behind.

If you are convinced that there is water or a natural spring, you should dig around to ascertain. Insects and birds tend to also gather near a water source, so keep an eye out for them. Look for birds and insects early in the morning and late in the evening.

ii) Flourishing Vegetation

The water causes greenery to become lush, green, and healthy. Look for a patch of greenery flourishing and growing in a dry patch of land.

A small spring may be the source of the water supply to the green patch. Once again, you can test the patch around the greenery by stepping on the area and watching for any seepage.

iii) Look for Areas That Do Not Dry

Muddy sections without visible water sources may be the area where the natural spring is bubbling to the surface.

The water will bubble to the surface and then seep back into the ground.

Take a shovel and remove any standing water, then dig into the soil for a few inches. Study the place to see if any water will seep back and take the place of the standing water you just removed.

If you do not have any burst pipes causing the pooling water, then you should explore the possibility of an underground natural spring.

3. RAINWATER

Rainwater is a leading source of water in off-grid living situations. Rainfall comes for a couple of months every year.

If you live in an area with adequate and consistent rainfall, you should have a lot of rainwater. This scenario especially applies to people who live off the grid in Polynesian countries or near a water body.

Creating a simple system of harnessing water will allow you to make this a consistent water source.

Things to Look Out For When Considering Rainwater Catchment

i) The Amount of Rainfall

Rainwater is the cleanest source of water that you can harness. An easy way to capture this water is to use your roof to channel the water into a storage area.

The amount of rain will determine just how effective this option will be as a source of water. If you are living in an arid area, this may not be an option

for you.

Measuring the amount of rainfall you can expect in a year is simple: Use a rain gauge.

The rain gauge is a cylinder that catches rain to let you know how many inches of rain has fallen on a given day. If it catches one inch of rain, then only an inch has fallen. A standard rain gauge features a funnel at the top and calibration along the length of the cylinder to help you determine the amount of rainfall.

According to the calibration, one-tenth of an inch of rainwater denotes one inch.

Here is a simple technique if you do not have a rain gauge:

- Place a bucket outdoors during the rainy season to capture rain.
- Measure the diameter of the bucket at the level of the rainwater collected. (However, you must subtract the thickness of the bucket walls to get an accurate water diameter).
- Measure the diameter of the bucket at the bottom.
- Next, divide the two diameters by two for an average radius.
- Next, get the area of the rainfall by multiplying the radius by 3.14.

Finally, the rain volume is averaged by multiplying the depth of the bucket by 3.14 by the radius. Therein lies the amount of average rainfall volume; This is a more time-consuming and labor-intensive process, so the rain gauge may be your best bet if you cannot go through this entire process.

ii) Roof Space

The amount of water you collect depends on the roofing system you have in place and the size of your house. A tiny house may offer you about 125 gallons of water, which is enough to cater to your needs if you are alone or just two people.

A house with a larger roof provides more water catchment opportunities resulting in more water in storage.

Consider the roofing materials. You can collect the water from a shingled roof but make sure your storage tank has an inlet screen to filter any debris and gravel from entering the water. The asphalt composition in shingles is inert, which makes them safe for water collection.

Standing seam metal and corrugated metal are also considered excellent roofing options for collecting rainwater. Standing seam metal features an enamel or powder coat which ensures that the water is safe from zinc and aluminum.

However, corrugated metal doesn't have the same coating, so you must be careful not to be ingesting zinc that leeches off the roof and into the water.

You can test your water for acceptable zinc levels even if you are using a corrugated roof. Just because you have a corrugated roof doesn't mean it is the end of the road for your water catchment

Solar panels also make an excellent water collection surface. So, if you have solar panels, you are not limited in your rainwater catchment activities.

4. RIVERS, PONDS, AND STREAMS

Some lots of land already have a river, stream, or even a pond on them. That provides a natural source of water immediately.

But you must take some of the water to be tested to detect any contamination or other problems. Rivers, ponds, and streams may be contaminated by wild animals drinking from them or even from the underground water table if that is their source.

Things to Look Out for When Considering River

i) Animal Traffic

There are many waterborne diseases that wildlife carry and that can contaminate freshwater sources. For example, Leptospirosis and Campylobacteriosis are carried by both wildlife and domestic animals.

Your pigs, horse, dogs, cat, and poultry can also transmit diseases like Salmonellosis, Yersiniosis, Rinderpest, Paratuberculosis, Anthrax, and

Actinomycosis.

ii) Test the Water

Make sure there is no arsenic in the water. Arsenic is scentless and tasteless, making it a very silent killer.

Some facilities will test your water for free for a wide range of metals.

iii) Water Rights

Make sure that you know if you have any water rights before using the water running through your land. In some states and countries, just because the water runs through your land doesn't give you the right to claim the water source.

Of course, you may not be punished for using up a few hundred gallons of water annually. But, if you decide to divert the river or stream. You may find yourself facing serious legal issues.

The Best Way to Store Water

Water tanks are an excellent water storage facility if you are living off the grid. It can be gravity-fed storage. That means that the tank relies on gravity to feed the water into the tank so that the tank only sits there and receives.

There is also the option of an underground cistern storage tank that stores water directly from the water table.

Look for the following qualities in a storage tank:

Size

You should choose the size depending on your needs. If you want a storage tank that fits in the house, you should consider a water closet tank; This is a tank that can fit through a 29-inch doorway, and they are portable. So you can carry them in your RV as you move around. This type of tank is used as an emergency water source in the house.

The alternative is using a stationary water tank is another option. This type of tank is used as the primary water storage facility. Stationary water tanks are typically plastic, and they come in various widths and heights.

The use of this type of water tank is to take care of the daily running of your home, while the smaller closet tank keeps more water to use in case this runs out. That means that the stationary tank gives you more storage space compared to the closet tank.

Design

You have the option of the underground cistern storage tank being specially designed only for underground use. You cannot use this tank for over-the-ground use because it will become deformed and may fail to work.

A closet tank is small and compact to make it portable and a good fit for indoors.

On the other hand, a stationary tank is designed with sturdy plastic that can withstand the weather elements, and it also takes up a lot of room. You need to create the best possible outdoor space to accommodate it to provide long service life.

A pillow or bladder tank is a low-profile collapsible tank that you can fit in crawl spaces. Most people living off the grid prefer to store fuel in it, but it can also come in handy for storing water occasionally. If you have to go and buy water or fetch from far away, this could be an excellent option.

If you have outdoor use like watering animals and plants, there is the option of a trough. A trough is designed to remain open, and it is easier to clean and fill up daily.

Material

The material used in making the tank is critical. Most storage tanks are made from plastic. It is crucial to ensure that you buy a tank made from safe plastic material. Look out for 100% virgin polymer as the plastic of use.

Virgin polymer is new and meets industry standards when it comes to the quality of resin used. The material is durable and robust, meaning the tank can serve you for long, even when placed outside.

Some plastics leach into the water, and that can be a health hazard. So, ensure that the plastic is not only virgin but also food grade. Since the container will come into contact with the water and the water will be used

for direct and indirect consumption, this is not something you can afford to overlook.

Water quality will degrade if you use non-food-grade plastic storage containers. Particularly beware of BPA plastic. BPA stands for Bisphenol A, an industrial chemical that has been in circulation since the 60s and is associated with health effects on possible elevated blood pressure, cardiovascular disease, and type 2 diabetes. It has been associated with behavioral problems, brain development issues, and even prostate health issues in infants and fetuses, and children.

If you opt for a metal storage tank, ensure that it is corrosion-proof so that it doesn't deteriorate quickly and contaminate the water within with rust.

Specific Gravity

Specific gravity refers to the tank's ability to hold the amount of water you intend to store in it. Ensure that you choose the right specific gravity for the needs in your home. Storage tanks feature specific gravity from 1.0 to more than 1.9 depending on use.

The higher the specific gravity, the better the ability for the tank to withstand hydrostatic stress from the water within.

UV Stability

Many of the storage tanks on the market, especially those intended for stationary, outdoor use, feature UV stability. The manufacturer should ensure that no UV rays can get inside the tank. UV rays promote faster deterioration of the tank, which in turn contaminates the water inside the tanks.

UV stability is done using UV stabilizers that prevent the photodegradation process. Photodegradation is a chemical process that causes chemical bonds to collapse within the polymer. The stabilizers absorb the harmful UV light stopping it from interfering with the water quality within by turning it into harmless low-level heat.

Corrosion Resistance

You should look for a storage tank that features both leak-proof and corrosion-proof properties. These properties ensure that you do not have to keep replacing your tanks after just a few weeks of use.

It is essential to look out for these two qualities if you want your tank to last for a long time. These are the most critical qualities to look for to ensure durability.

Color

Color may seem like a trivial matter, but it plays a role in the temperature and quality of the water inside the tank. Darker colored tanks tend to retain heat leaving the water inside the tank warm to hot depending on the intensity of the sun.

If the tank is lighter colored, it will be cooler as the color deflects the heat away from the tank instead of retaining it.

Before purchasing a tank, it is best to know exactly where you intend to place it so that you can opt for a darker or lighter color.

If you do not have the time or expertise to seek out a storage tank with the above qualities, you can ask a plumbing expert to accompany you shopping and check your list of requirements.

The Take-Away

- Find out the existing water sources and collection options in the location you have in mind for off-grid living.
- Save sufficiently to be able to harness water and channel it close to your space.
- Ensure that you have your water source tested for contamination and safe human consumption before you begin to use it. That applies even if it is a freshwater source.
- Find out how sustainable your water source is. Even if you will rely on rainfall, it is best to measure the amount of rain to know if it is reliable and enough for your needs.
- Always have more than one source of water in case one dries up or it becomes contaminated.

- Educate yourself on water rights if you own a piece of land with a water body on it or running through it.
- Invest properly in water storage facilities that will hold enough water for your needs while also preserving the water quality within.

4

SUSTAINABLE ENERGY OPTIONS FOR OFF-GRID LIVING

> ***"Solar power is the last energy resource that isn't owned yet-nobody taxes the sun yet."***
>
> — BONNIE RAIT

The beauty of living off the grid is understanding and enjoying sustainable energy. Sustainable energy is renewable, meaning that nature replenishes your source of power naturally.

For example, solar energy comes from the sun, which is a natural ball of energy. There is nothing that you can do to limit the energy that comes from the sun. Even when there is cloud cover, you can find a way to save energy harnessed for later use.

The good news is that sustainable energy options have a zero-carbon footprint. That means that they leave no adverse effect on the environment.

There are several sources of sustainable energy. They are:

1. Solar
2. Hydro
3. Geothermal
4. Wind
5. Biomass
6. Tidal

Solar Energy

Solar energy comes from the sun. This is perhaps the most well-known source of sustainable energy that is affordable and accessible to people that are considering off-grid living.

It involves harnessing power directly from the sun by capturing the sunrays and storing them in solar panels.

Sunlight is abundant in arid and semi-arid areas. You can also access it in tropical regions at certain times of the day.

Fun fact about solar energy: The amount of solar energy reaching planet earth in an hour can handle the entire planet's total energy needs for a year.

How Does Solar Power Work?

Solar panels come with a technology that converts sunlight into electric energy. When the sun shines on the solar panels installed on your roof, the energy is absorbed by the photovoltaic cells (PV cells); Once the energy is converted into electrical charges that respond to the electrical field inside the cell. As a result, an electrical current is formed, which then flows out into appliances and for use around the house.

The electric charges are transported to an inverter that converts the direct current into usable AC.

You can use a battery bank to store some of the energy. A solar battery bank acts as an emergency storage unit for your energy, especially during those times when it is not very sunny.

You see, solar energy is not like gas or water, which can live in distribution lines. Once the energy is converted into direct current, it needs to be utilized or stored in the battery bank for future use. The good news is that if you do not have a solar battery bank, you can consider selling your excess power to a power company in an exercise known as net metering.

You can maximize your investment in your solar panel by net metering.

Look out for any incentives offered by local power companies or the government for people with solar power systems.

Some tax incentives include federal and state tax breaks if you decide to invest in solar energy as your home or business's sole power source. In some states, you can even get a rebate on past electrical bills just for choosing to go solar.

You have the choice of two types of solar panels:

PV Solar Panels

The PV panels are the most commonly used option. They catch the solar energy and convert it to electricity. These types of panels are usually connected to each other to form a large unit which is referred to as a module.

Thermal Solar Panels

These solar panels are installed onto the roof with the intention of heating water. Hence, these types of panels cannot power appliances but are designed to heat water.

They turn the sunlight into heat instead of power.

Even if you have to remain on the state power grid for one reason or another, thermal solar panels can be instrumental in bringing down your monthly electric bills.

When installing a solar panel, here are some best practices to follow:

- Find the best, long-lasting solar panels.
- You need a south-facing roof for the best result. Although it is not a necessity, it is a good idea.
- Consider a 30-degree angle for the best year-round solar production. If you cannot achieve 30 degrees, you can settle on an angle between 15 and 45 degrees.
- Install the panels vertically for better placement. Horizontally laid panels tend to protrude off the roof. However, both vertical and horizontal panel orientation is acceptable.
- Install the panels on a rack instead of laying them flat. The racks will tilt the panels at an angle of about 10 degrees. Panels that sit

flat on the roof tend to trap water underneath after it rains. That can interfere with their operation in time.
- Only use a qualified installer to onboard your solar panels. Make sure they offer a warranty for their work so that you can call them if the panels act up. In some states, the only way to qualify for some tax breaks, your system needs to be installed by accredited installers.

Geothermal energy ties in with solar energy because it is the use of solar energy trapped in the ground. You can utilize this energy in tandem with solar energy, using them interchangeably.

Hydro Energy

As the word hydro suggests, this type of energy is harnessed from water.

Did you know that the 7% of the power that you enjoy on the national grid in the United States is generated by water?

Hydro is also known as hydroelectric power. This power requires you to divert the flow of the river or dam to generate power.

However, hydropower requires a constant, never wavering supply of water. That means that your supply of water must never run out.

Also, you have to contend with water rights in your area if you want to use hydro energy. It is one thing to use several hundred gallons of water for home use and quite another to divert the water source to generate electricity.

If you have water rights, you can use the river water on your land without any legal ramifications. But, ensure that you have prior appropriation water rights.

Fun fact about hydro energy: Ancient Greeks used water to produce energy for running the wheels on age-old grain-grinding machines.

How Does Hydropower Work?

When the water flows downstream, it utilizes kinetic energy to turn the turbines. The amount of energy generated will depend on the volume of water flowing and the elevation from one point to another.

The more the flow and greater the elevation, the more electricity you will generate.

The water flows through a pipe, and as it gushes out, it turns the blades of the turbine by pushing against them. As the turbine blades turn, they spin a generator, producing electricity. If you intend to use hydropower, you have to harness the water's power at the river's source, where the force of the river's current is at its highest.

The primary role of the hydraulic turbines is to convert the energy imparted by the moving water into mechanical energy that the hydroelectric generator turns into electricity.

For hydropower to work, the water has to be running fast or falling at great speed. Countries like Kenya continue to use hydroelectric power to power the entire country and sustain its economy. It is one of the countries in the world with a small carbon footprint when it comes to energy production.

Because water is a sustainable source, it can be banked on for as long as it is available. However, you have to remember that, unlike the sun, which is never wavering, water can dry out, or the source can get depleted.

Here are the best practices to adhere to when using hydropower:

- Make sure the water source is sustainable. It is irresponsible to use water from a source that can be depleted.
- Check the local conservation efforts. If harnessing the water will cause harm to flora and fauna near the river source, you may land in trouble with local conservationists or conservation laws. For example, hydropower harnessing can cause low dissolved oxygen levels, which endanger the lives of plants and animals living in the water or around it. Dams to harness hydropower also affect fish like salmon by preventing them from swimming upstream.
- Make sure you use the correct turbines and generators to harness the power
- Harnessing water power is an expensive venture. Therefore ensure that you put away enough to build one.
- Make sure that you work with a small hydro system that can break down the air in the water to solve the problem of low dissolved

oxygen levels.

Hydropower offers you three main advantages. They are:

- Low to little carbon emissions since it is a natural source of energy.
- Sustainability because it is a renewable source of energy.
- It can be a great way to utilize contaminated river water.

Wind Energy

If you live in an area with high winds, you may have the privilege of using wind energy. Wind energy is simply the power that is produced when the kinetic energy of wind creates mechanical energy that is then turned into electricity by a generator.

Wind energy remains one of humanity's technological breakthroughs that we can be proud of to help our planet thrive. The future of wind energy appears sustainable and safe because it releases no air pollutants.

Offshore winds blow more uniformly and harder than winds on land which means that if you live close to a water body, you may be at a greater advantage than someone on land.

How Does Wind Energy Work?

Wind patterns differ all around the world, and they tend to be modified by the presence and absence of water bodies. In areas where the wind is a lot, you will experience consistent wind power.

A wind turbine converts the wind energy into electric energy using aerodynamic force like the energy from a helicopter rotor blade. The rotor on the turbine is connected to the generator so that aerodynamic force in rotation creates electricity.

Wind turbines can be built on land or offshore.

There are two types of turbines:

- Horizontal-axis turbines.

- Vertical-axis turbines.

Horizontal axis turbines are the most common wind turbines that many people associate with wind power. These turbines feature three blades and are typically placed upwind to harness wind energy. The turbine pivots at the top of the tower facing its blades towards the wind.

Vertical axis turbines are omnidirectional, meaning they do not have to be placed upwind or facing a particular direction to harness the wind's energy.

An example of a vertical axis turbine is the Darrieus Model, which features the eggbeater design.

Land-based wind turbines can produce as little as 100 kilowatts to as much as several megawatts. They are the most affordable option, and they tend to be clumped together to provide bulk power.

If you are working with off-shore turbines, they can be quite large. You may be looking at one turbine being the size of the statue of liberty. These are the type of turbines that can be used for commercial or communal purposes if you have a large off-grid community living together.

They capture the powerful ocean/sea winds and use them to generate massive amounts of clean energy.

Small turbines, whether land or offshore-based, that are installed near where their energy is utilized are also called distributed wind turbines. These tend to be the small turbines that are used to facilitate agricultural, residential, and small commercial applications. They can even support small industrial use.

The good news is that if you do not want to rely entirely on wind power, you can use it in conjunction with other energy resources like diesel generators, photovoltaics, and batteries in a hybrid system.

Such a hybrid system works best for the off-grid living application.

Here are some best practices to consider when it comes to wind turbines

- Ensure that you have a space that is undisturbed by human traffic. That is why wind energy works very well in remote areas because they work undisturbed.
- Ensure that you build at a good distance from the turbines because some of this equipment generates a lot of noise.
- Carve out a place where the turbines do not interfere with your view if that is possible.

Biomass Energy

Biomass energy refers to the use of organic matter as a form of fuel in electricity generation. If you live in an off-grid area, you are lucky enough to have access to several biomass resources around you.

There are six primary resources of biomass that you can depend on if you are living off the grid in remote and semi-remote areas:

- Dedicated energy crops
- Agricultural crop residue
- Forestry residues
- Algae
- Wood processing residue
- Wet waste

There is also the option of using sorted municipal waste like residential and commercial garbage, paper, food wastes from factories, textiles, and leathers. This option will work if you live near a town or city where you have access to recyclable material and sorted municipal waste.

Burning biomass returns the carbon dioxide that was used by the plants during growth back into the environment. That is unlike burning fossil fuels which just release carbon dioxide into the atmosphere resulting in an imbalance in the CO2 concentration in the air.

1. Dedicated Energy Crops

These are non-food crops explicitly grown to provide biomass. They are typically grown on marginal land, which is not suitable for growing food

crops like corn, among others. Marginal land has little profit value mainly because of a poor agricultural profile or its prohibitive farness from human traffic.

Dedicated energy crops can be broken down into two categories: Woody and herbaceous plants. Herbaceous plants are perennial, meaning that they will continue being productive for over two years. You can harvest from them for two to three years if they continue to reach full maturity.

Herbaceous plants used as dedicated energy crops include:

- Kochia
- Tall fescue
- Miscanthus
- Switchgrass
- Bamboo
- Sweet sorghum

The alternative dedicated energy crops are the short-rotation wood plants. These are fast-growing woody plants that require five to eight years to grow and mature. Within this time, they help to improve the soil and air profile.

Some short-rotation wood crops include:

- Black walnut
- Silver maple
- Eastern cottonwood
- Sycamore
- Sweetgum
- Hybrid poplar
- Willow

You will notice the above list features a mixture of soft and hardwoods. You can mix the harrowing and softwoods to balance their strengths. Hardwoods contain less carbon and are not as dense as softwoods which feature more energy with higher carbon content. Fuelwood, in the form of short-rotation

woody crops, produces heat that can generate electricity for residential, commercial, and even industrial use.

Herbaceous crops have little to no woody content, but they have a high carbon and energy content. You must have a harvesting strategy for both the herbaceous and short-rotation woody crops.

That entails making sure that the plants are harvested on time to allow the possibility of regrowth during the growing season. Also, make sure that you have a plan to replace nutrients in the soil after harvesting to promote new growth. To do that, you should consider fertilizer application and get rid of life-choking weeds.

All the above, and more, plants have a proven resilience that guarantees you successive annual harvests over several years.

Dedicated energy crop material can be used in the following way to generate energy:

Direct combustion

Direct combustion entails burning the waste materials to heat water that generates steam. The steam turns turbines connected to a generator which produces electricity. The steam comes out of the boiler at high pressure to turn the turbines that rotate and drive an electricity-producing generator.

Gasification of the dry matter

Gasification produces syngas that is used to turn the turbines which power the generator producing electricity. You need gas turbines if you intend to use the gasification process because syngas is in gaseous form.

You will also need a gasifier, a steel tank that is carefully engineered to process the waste matter, allow the precise amount of oxygen, and create the best gas for end-use. Having a gasifier eliminates the human error that comes with trying to do this process manually.

Advantages

- You can make good use of marginal land.

- Combustion of organic crops is easy on the environment because of the carbon dioxide released is absorbed by the plants.

Disadvantages

- It can lead to deforestation as people look for hard and softwood for this purpose.
- You need space to accommodate a digester.

2. Agricultural Land Residue

Agricultural land residue refers to all the plant material left on the surface and within the soil after all the food crop has been harvested. The residue includes:

1. The stem
2. The stalks
3. The leaves
4. Pods of the plants
5. Husks
6. Cobs

Using agricultural land residue allows you to leverage the land without interfering with the annual cultivation, growth, and harvest of essential food crops.

Sources of agricultural land residue include:

1. Corn stover
2. Oat straw
3. Wheat straw
4. Rice straw
5. Barley straw
6. Sorghum stubble

Not only can you use these crops for personal biomass production, but you can also sell any excess residue that you may have to places like the local biorefinery or other off-grid community members.

That is a great way to generate additional income from agricultural products if you are an off-grid farmer.

There are several ways to generate electricity from agricultural land residue

Direct Burning and Co-firing

This type of waste material can be burned to generate heat that converts water into steam. The steam powers a turbine connected to a generator which produces electricity.

But, you can also co-fire the agricultural land residue and fossil fuel which eases the need for coal. Burning this residue with fossil fuel reduces the amount of carbon dioxide and greenhouse gases produced by fossil fuel.

Pyrolysis

This means that the waste is heated to a degree of between 200 and 300 degrees Celsius without oxygen so that it doesn’t combust. The process of pyrolysis causes a chemical alteration of the waste material to create pyrolysis oil, a dark cooled bio-fuel oil. Pyrolysis oil, also known as bio-crude or bio-oil, can be burned to generate electric power.

The process of pyrolysis is also responsible for producing syngas which can be converted to methane, a better replacement for natural gas.

Pyrolysis also applies to dedicated energy crops

Gasification

Syngas is also produced through the process of gasification. The waste is heated to more than 700 degrees Celsius within an environment with a very controlled amount of oxygen. Carbon monoxide and hydrogen (syngas), and slag are produced from this process. The syngas is cleaned to remove sulfur, mercury, particles, and other pollutants.

The cleaned gas is used to power turbines that help generate electricity.

Anaerobic Decomposition

You can opt for anaerobic decomposition, which utilizes bacteria to break down the agricultural land residue and produce methane gas. The methane gas can be used to replace natural gas. The anaerobic activity must take place in an oxygen-deprived setting.

Methane gas can replace fossil fuels in heating and cooling your home.

Black Liquor

If you live near a paper mill, you can access the black liquor produced at the mill due to wood being processed into paper.

This is a biofuel that retains over 50% of wood's biomass energy. It can be recycled using a recovery boiler and used to power machinery in your home instead of using electricity. It can also be used to produce syngas that works to generate electricity.

Hydrogen Fuel cells

Agricultural land residue is pretty rich in hydrogen, which can generate electricity from stationary hydrogen fuel cells.

For example, the Yosemite National Park in the United States uses hydrogen fuel cells for electricity and to heat water. According to the United States Department of Energy, biomass can produce 40 million tons of hydrogen annually.

Advantages

- Agricultural land residue is readily available after every harvest season making it affordable.
- The waste produced doesn't compete with food production.
- It can be used sustainably in remote agricultural areas.
- It doesn't produce excessive carbon dioxide even when burning.

Disadvantages

- It works well for people who own their land, so it may not apply to modern off-grid living.
- It takes expertise to work with anaerobic digestion and other science-related areas.

3. Wood Processing Residue

Wood processing residue is material that comes from the woodwork in carpentries, mills, and lumber yards, among other wood-related industries. That includes residue like sawdust, tree barks, tree pulp, leaves, and roots.

The best part of using wood processing residue is that all the material is collected at one point as the woodwork continues. You can collect this residue from wood mills or logging cabins where there is a lot of wood being processed.

For example, in the lumbering process, the tree bark, shavings, sawdust, and trimmings are removed. They can be immediately used to generate electricity.

There are three primary ways to generate electric power using wood-processing residue. They are:

Direct Combustion

This is where you burn the wood residue to heat water that produces steam. The steam drives steam turbines which are connected to an electricity-producing generator.

Thermal Gasification

The waste is subjected to high temperatures (without combustion) in an environment with controlled amounts of oxygen or steam. The process produces carbon monoxide, hydrogen, and carbon dioxide. The waste must be carbon-based for this process to work, so softwood with high carbon content is the best option. Syngas is the direct result of thermal gasification.

The syngas produced runs a gas engine or gas turbines, which in turn drives the generator responsible for generating electricity.

Fast Pyrolysis

The fast pyrolysis process also produces syngas in addition to liquid fuels similar to diesel. Fast pyrolysis is the process in which the wood material is heated quickly in the absence of oxygen at temperatures of between 450 and 600 degrees Celsius.

The heated material produces vapors that are condensed to form biofuel. This biofuel is used to turn turbines attached to a generator that produces electricity. The best part is that wood is an excellent choice for rapid thermal decomposition.

Advantages

- There are multiple ways to generate renewable energy to produce electricity: fast pyrolysis, thermal gasification, and direct combustion.
- The carbon dioxide produced by this biomass is not too much, so the growing plants quickly reabsorb it.
- It is an excellent way of disposing of wood waste material that can cause wildfires if left unchecked in remote areas.
- You can find biomass combustions chambers that are self-cleaning/

Disadvantages

- The biomass boiler needed for the job tends to be bulky, and you also need a large space to store the wood processing residue waste.
- The wood residue must remain dry to burn efficiently, meaning you have to consider creating a storage facility.
- The boilers need to be cleaned out every week.
- You have to find a supplier for the wood residue close to you to reduce the inconvenience of going far and wide to collect it.

Sorted Municipal Waste

Solid municipal waste can be used as biomass material while at the same time keeping the environment in urban areas cleaner and safer. Because sorted municipal waste poses a continuous disposal problem for urban and

suburban areas, municipalities are more than happy to hand this waste material to off—gridders interested in using them for biomass.

If you use sorted municipal waste as a biomass resource, feed the waste into a combustion chamber to burn. The heat released by the burning waste will convert water to steam which turns a turbine connected to a generator. That causes the generator to produce electricity.

You can also use the gasification and pyrolysis processes with solid municipal waste to generate energy, electricity, and other forms of power.

Advantages

- It is a cost-effective way to dispose of municipal waste in localities.
- You can utilize safe fermenting organisms to help biologically convert the biomass to biofuel.

Disadvantages

- Municipal solid waste is a complex mixture of all manner of waste that has to be handled with care.
- This waste has low energy content, which presents a problem for high energy production
- You have to invest in a highly effective anaerobic facility which can be expensive.

Other Energy Options

Tidal Energy

Tidal energy works by harnessing the kinetic energy found in the rise and fall of ocean current and tide. It is also called tidal flow, which can be converted into electricity.

There has to be a large tidal range. That means that the height difference in the high and low sea level tides should be significant. The more the height

difference, the more energy you can expect to harness. The tides are determined by the gravitational pull of the moon and sun.

The good news is that tidal energy can be harnessed day and night, unlike solar energy, which depends on the hours when the sun is out, the same as wind energy.

Tidal energy is not your typical off-grid option for power generation. Unfortunately, tidal energy is only applicable for large-scale applications, so it may not be something you can explore if you are living off the grid on your own. Typically, it is explored for commercial applications. We mention it here because as research around it grows, it may become an option for electricity companies to offer to people living off-grid.

The tides hold a vast amount of energy that it is estimated that they can generate enough electricity to cater for a third of America's electricity needs.

How Does Tidal Energy Work?

There are three primary approaches to harnessing tidal energy:

- Using tidal barrages.
- Using tidal turbines.
- Using tidal fences.

Tidal Barrages

A tidal barrage is a dam with low walls. It is placed at the estuaries or inlets where the tides come in and out. They work like a traditional hydroelectric dam because they feature sluice gates to create a reservoir on one side of the dam/barrage.

The barrage is securely fitted to the bottom of the sea/ocean floor, with its top peeping just slightly above the water at the point where the flow comes in at its highest tide. There are turbines inside a tunnel at the bottom of the barrage. The tunnel allows water to flow into the barrage.

As the tides come in and out, the turbines continually turn. As the turbines turn, they are connected to a generator which produces electricity. During

high tide, the water covers the turbines, and during low tide, they may become slightly exposed.

The barrage is constructed with concrete, and they wall off the area where the turbines are located so fish and other sea creatures cannot pass through.

Tidal Turbines

These turbines work similarly to wind turbines, with the only difference being the location. Tidal turbines are placed underwater, and they turn as the water current pushes against their blades.

The blades are connected to a generator that produces electricity for use. Because water is denser than wind, tidal turbines do a much better job of producing electricity than wind turbines. But these turbines need to be much stronger to withstand the density of water.

The good news is that, unlike tidal barrages, they do not alter the marine ecosystem they find in place because fish can still swim through them safely. However, they tend to emit a low hum as they turn, which may scare away marine life.

Tidal Fences

The tidal fence is a hybrid of the tidal turbine and tidal barrage. It features turnstiles placed next to each other to form a fence-like wall. The fence also spins like turnstiles, and the process generates energy that is converted to electricity in the attached generator.

You can expect to see vertical blades on a tidal fence, and although they are close together, they do not form an impenetrable wall like the tidal barrage.

Tidal fences are typically found at inlets or where there are fast-moving streams. They will be completely submerged in water.

Currently, there are only nine tidal power stations globally. These are for research purposes, but as the technology surrounding tidal power grows, there are increasing chances of commercial energy applications.

The cost of installing tidal power plants is expected to decrease as technology grows. Maybe in the future, this may be a viable option for

communities of off-gridders but with the help of power companies or major corporations interested in investing.

The Take-Away

- Choose the area where you want to settle with the sustainable energy source of your preference in mind.
- Do not be afraid to explore multiple energy sources and create a hybrid energy solution for your needs. For example, you may be near a sustainable water source, and the area also has ample sunshine all year round. You can opt to harness both solar and hydro energy.
- Consider your energy options according to your budget. But you can also opt to join an off-grid living community with an already established renewable energy grid to reduce the cost of having to do all the installation yourself.
- Do not waste agricultural land residue and other sources. Instead, use them for biomass. But be careful about deforestation, which devastates the environment.
- Tidal energy is a great option, but it may be out of range for regular off-grid living.

5

NUTRITION AND FEEDING YOURSELF WHILE OFF-GRIDING

> ***"I don't understand why asking people to eat a well-balanced vegetarian diet is considered drastic, while it is conservative to cut people open or put them on powerful cholesterol-lowering drugs the rest of their lives."***
>
> — DEAN OMISH, MD

No matter the settings you are in, on or off the grid, healthy nutrition rings true. Living off the grid is not convenient for most, but it has its perks that positively affect health. The beauty of nature and living off the land does something special for the soul. That feeling is hard to replicate in the urban jungle.

But then anyone looking at off-grid living is already ready to tap into that mystic of nature.

Even for the skeptic, there is no denying that waking up to the chirping of birds, morning dew on the grass, and a full-blown sunrise can change your perspective.

A breakfast of home-baked bread or substituted with corn, arrowroots or sweet potatoes, and groundnuts with a mug of tea laced with lemongrass picked from your backyard garden sure beats a Macdonald's breakfast on the go any day. The nutritional health benefits of such "country meals" are distinctly superior in the long run.

Besides, the level of activity you have to put in to make things work daily will get you fit and healthy. While a lifestyle of homesteading is no walk in the park and certainly not for the faint-hearted, it contributes and encourages healthy living. There is a lot of walking, hauling, pulling, pushing and other grunt work involved.

Bottom line

You will find that you need healthy meals to sustain the life of a successful homesteader. And, even if you are not into homesteading, you cannot afford to live on junk food when living off the grid because of the lack of accessibility to fast food joints.

Living off the grid means that you may have little to no access to the conveniences that one usually takes for granted when living on the grid. These include things such as grocery stores where you can buy over-processed foods and fizzy sugary drinks.

But look on the bright side: It is the beginning of weaning yourself off life-threatening food choices and eating straight from the earth.

Successfully living off the grid boils down to meticulous planning and patient execution that ensures you have enough food to not only survive but thrive. In the process, you learn to tap into the natural resources and the bounty that nature provides you with and take advantage of it. Most people may think that living off the grid means eating less, but not necessarily. It often means being mindful of what you eat and that you don’t run out of food. Besides, it is hard work to hunt, gather and plant food. You learn to be more careful with your supplies. No more unnecessary leftovers to throw away every night. You learn to cook what you will consume.

With proper long-term planning, you will be feasting on fresh vegetables, herbs, nuts, homegrown or hunted fresh meat, and fruits in season, all organically grown. In this chapter, we shall explore how you can eat like a king and have your stores full for a rainy day. Living in the boondocks can have you eating better, healthier than you ever did without compromising on the amount of food you consume.

Growing Your Food

If you plan on living off the grid, the convenience of passing by a grocery store and grabbing veggies and supplies every other day goes out the window. And, while you may drive to town once in a while to reload on essentials such as medical supplies, salt, matches, and other survival essentials, you need to learn to live entirely off the land on your property.

That will ensure you bring down the cost of living as you intended by moving off the grid.

A big part of happiness and healthy living off the grid is nutrition. So, now that the convenience store is not an option, what do you do for food? This is an essential question when considering living away from the typical urban setting. Initially, for most homesteaders with an urban background, this can be a hard lesson to wrap their heads around.

That is a massive leap and needs adequate mental preparation and plenty of research.

But, if you have lived a portion of your life in the countryside, that may not seem like a foreign concept.

While to some, the cavalier idea of living off the grid might seem appealing and even romantic, a lot of thought must go into it. It may, in some aspects, seem similar to camping out in the wild, but that is only a part of the true presentation of actually living off the grid and being entirely dependent on the land.

For many people, such romanticism is shattered when they run out of milk or meat goes bad due to poor storage. What if you run out of food in the middle of nowhere? Living off the grid goes hand in hand with learning to work the land.

But as Gordon Hinckley so aptly puts it:

> ***"You can't plow a field simply by turning it over in your mind."***
>
> — GORDON HINCKLEY

What can you grow if you had to depend on the piece of land that you are living on?

There are plenty of options that you can grow on your piece of land, no matter how big or small. But, before you begin mapping out the plants you want to grow, there are a few factors to consider and have in place to grow food successfully:

- Water
- Compost
- Climate

Water

The presence of water and access to it is crucial to growing your food. If you are contemplating going off the grid in a remote place, it is fundamental that the property you acquire has or is near a reliable water source. That's because your survival will depend on your ability to plant and irrigate the food crops you need for sustenance.

A nearby river, lake, or dam can effectively serve as a water source. Alternatively, if the water table on your property is high enough, you can sink a borehole or dig a well. Building a water reservoir or using a rugged storage water tank can also help you trap plenty of rainwater during the rainy season. That provides water to help you make do in times of drought.

These water catchment options should be explored while scouting potential properties. Also, look at the viability of the water source. Some sources may appear to be viable, but they fizzle out with time and use. Research the origins and sustainability of any nearby water sources to determine how long they can serve your agricultural purposes.

It is best to set an irrigation system that works for you for better efficiency and minimize the daily chore of watering your plants. Drip irrigation is a splendid way to irrigate your garden and is pretty easy to set up.

Drip irrigation involves delivering water to the plants by dripping slowly. Not only does it not flood the crops unnecessarily, but it also saves water. It

is essential to use irrigation methods that conserve water when living in a remote area.

Compost Manure

The whole idea of living off the grid is to cut down costs to a minimum while still making your living space as comfortable as possible. Naturally, producing your food and having more than enough to survive on is a vital and integral process to thriving away from the comforts of urban living. For that, you need fertilizer. But why depend on commercial fertilizer that is expensive and sometimes may not be a good fit for your soil profile?

Instead, work to make your compost manure.

Fertilizers can be expensive and inaccessible when living off the grid. Making your compost will be sufficient for growing your plants as it enriches your soil with the correct nutrients that your plants can feed off.

Making compost is reasonably easy. All you have to do is dig a shallow pit and throw in organic matter such as plant matter such as twigs, leaves, branches. Throwing leftovers such as fruits, vegetable leaves, eggshells, and other organic material into the pit adds to the composting nutrients.

It also helps balance the carbon and nitrogen levels of the compost.

If you rear some animals, you can add the dung into the compost pit for an even more potent compost pit mix that your plants will thrive on. But, do not add fecal matter from dogs and cats because they contain harmful bacteria and parasites that find their way into crops meant for human consumption.

Thought out off-the-grid living ecosystems can be low cost after the initial expenses of setting up.

That’s because very little goes to waste. Rearing some animals and growing your sources of protein also helps provide you with meat protein in your diet. Some poultry like ducks, chickens, and geese are very good foragers that eat and clean pests from your compound.

Chicken, for instance, will eat worms, grass, and bugs on your compound, while ducks such as the hardy Muscovy breed will eat mosquito larvae from

stagnant puddles and rid your compound of snails and slugs. Over and above that, a chicken and duck coop will provide you with eggs and plenty of manure to add to your compost pile. Some vegetable leftovers, such as kale, spinach, or cabbage stalks and leaves, make excellent feed for chicken.

The chicken and ducks will forage for food, control pests, and eat your house leftovers while providing your household with eggs, meat, and manure. Just make sure you find a way to keep them away from your garden by using something like a netted fence.

Climate

When growing your food, you want to grow plants that are agreeable with the climate of your area. If you are in an area that experiences winter, then you will have to plan around planting in the spring and harvesting in the fall and in between.

Depending on the climate of your region, plants that have a short turnaround growth period are recommended. Here are some options to consider:

- Green beans (55 to 65 days)
- Carrots (30 to 40 days)
- Kale (55 to 65 days)
- English peas (50 – 60 days)
- Spinach (40 – 50 days)
- Potatoes (3 to 4 months)

While you may want to plant grain like maize, your climate may not permit it. Maize requires six months of sunshine to grow well and a decent rainfall to deliver a good harvest. However, if the climate in your area permits, then you can opt to grow the grain. Corn is an excellent grain due to its longevity in storage once harvested and dried.

Growing Your Own Protein

Maximizing the amount of land that you have will make your homestead self-sustaining. The beauty of homesteading is that once you figure out

what your needs are and what your environment throws at you in terms of natural resources and inhibitions, you are in a position to plan better and become self-sustaining. While a sizable chunk of land is welcomed, one does not necessarily need a massive piece of land to live off the land successfully.

It’s astounding what you can achieve with a small parcel of land as little as 1/8 of an acre (50 feet x 100 feet) in terms of food production. Not only can you build a sizable and comfortable house using locally available material, but you are also able to grow a survival garden that keeps you and your family nourished all year round.

But beyond that, you can also be able to effectively and sustainably grow meat protein sources by rearing rabbits, poultry, and goats. First of all, these animals do not require a lot of commercial feed and can live on pasture if you have the space to let them wander and forage for themselves.

Secondly, construction for their housing can be simple and highly efficient in allowing them to graze and feed on worms and bugs off the earth, such as is the case of poultry like chickens, ducks, and geese. If you don’t have space and materials to construct a barn, you can build simple mobile cages for use in the summer and a well-constructed small coop that will shield your birds during the winter months.

Mobile Cages

These can be square or rectangle in shape and are ideal for the spring, autumn and fall when there is vegetation and plenty of bugs. When you cannot free-range because of land space constraints or lurking predators, this method of rearing poultry is quite effective in saving space, land management, and cost-effectiveness.

You can make the cages as big as you see fit, but typically, dimensions of 6-8ft L x 4ft W x 2ft H are adequate to house eight chickens comfortably with plenty of room to roam around graze and feed on bugs. The cage can be made from a wooden frame, covered with chicken mesh on the sides and the top with an open bottom. It is advisable to have half the top covered with an iron sheet to shade the scorching sun or shelter from sudden rain.

The cage should also have a drinker with fresh water and a perch to keep your chicken comfortable when they want to roost. The cage can stay in the same spot for several days. In favorable weather, you do not have to move the chickens at night as they can sleep there protected from wild animals.

When you feel they have grazed that cage area sufficiently, you simply drag the cage to the next spot of fresh grass and bugs for your chicken to feed on. In the meantime, the previous area they had been grazing on is left to regenerate and be ready for use another time. So, you never run out of space for your chicken to feed on and continue to grow.

You can make as many of these cages as your land allows you to and grow as many chickens as your space allows at a meager cost. That ensures that you have a constant supply of chicken and duck meat for your meat protein needs. When rearing chicken and ducks, you can expect them to be ready for butchering anywhere from weeks to months.

If you are homesteading in a small parcel of land and want to keep all your chickens contained but still foraging, you can also build a chicken tunnel around an area of choice on your compound─Along the fence of your compound is usually a good idea.

A chicken tunnel is about 3 feet high from the ground to the highest point of its roof and can be about 3 feet wide. The tunnel can be the length of your entire compound or a section that is most convenient. Like the mobile cages, the chicken and ducks can forage for bugs and nibble on available vegetation with the tunnel.

The tunnel can be connected directly to the chicken coop so that in the mornings, the birds can easily access the tunnel, and in the evening, they can make their way back to the coop from the tunnel without a fuss.

These simple yet effective homesteading methods of growing poultry kill two birds with one stone. They serve to protect your precious vegetable garden from invasion by your chickens and ducks, and they also protect the chicks from being preyed upon by hawks. The third angle to this rearing methodology is that they are less dependent on commercial animal feed as the birds can free-range within confinement for their protection and land management.

Rearing rabbits is another excellent way of producing your own organically grown meat protein. Rabbits are remarkably prolific breeders and are relatively easy to manage. They are another excellent choice for growing your own meat. Hatches are quite simple to build, and they do not take up much space. You can breed rabbits in several sections of your off-the-grid home.

If you have a spacious garage with decent ventilation, you can set up a few cages in there. An enclosed space such as a garage offers good protection from the cold winter months and can help you get started right away before building another housing structure elsewhere in the compound. Typically, one rabbit cage can house a large breed about 3 feet L x 2 feet D x 2 feet high. Cages can be constructed from wood, wood offcuts, or you can invest in some steel ones that can be mounted on chains and stacked against a wall.

They are an exceptional choice for growing your own meat because one female rabbit gives birth to a litter of 6-10 bunnies. Their gestation period is short at 28-30 days, meaning they can provide an endless supply of meat. They carry a pregnancy for only a month and give birth to many kits that replace the ones you may be feeding on currently. What’s even more remarkable is that they can get pregnant again immediately after birth.

However, you want to rest your female rabbits for a month before giving them over to the buck. This will allow your doe to live longer and reproduce healthily. The bunnies feed primarily on hay and any other edible leafy greens such as those leftover greens from your food prep. The cost of raising them is very low, and they are not labor-intensive. Bunnies are ready for butchering within 5 months at a good weight of about 3kgs.

If you have five female rabbits and one or two bucks, breeding them means that you stand to have 30 bunnies at the end of 30 days. That is with a conservative survival rate of five bunnies in every litter. Given that a female rabbit can comfortably give you four to five litters in a year, all things square, you can have more than a hundred bunnies in a given year. You should never lack meat protein with rabbits when living off the grid.

Rabbits need constant clean water, clean cages, and be sheltered away from the cold or too much sunlight. Their primary food is hay and weeds, such as

blackjacks. Rearing rabbits of the grid work well because they also provide your garden with nitrogen-rich manure.

Milk is another source of protein and calcium that can be quite a luxury if you are living off the grid. If you have a huge swath of land and plenty of pasture, rearing cows is an option. Then you won't have to worry about milk as much.

However, if your property is small, rearing a cow is probably out of the question. But goats are not. They occupy minimal space, eat a fraction of what a cow would eat, and they will provide you with meat and highly nutritious milk that is rich in vitamin A.

Goats thrive on pasture and brush and will survive even in areas where there is little vegetation. They are good foragers and require minimal care, and their housing is easy to construct with locally available material. However, they should be sheltered from direct wind, and their cages should be raised from the floor. The flooring of their housing should have struts so that their pebble-like manure and urine find their way out of the cage. This way, the cage remains reasonably clean and disease-free.

While there is always so much to learn when rearing animals, these animals are easier to rear, even for someone new to breeding animals. If you have them, you can be sure of a good supply of protein from their meat, milk, and eggs to complement the produce from your vegetable garden. So, as you can see, it is possible to live off the grid and still have plenty to eat. With adequate planning, you should have food that meets the nutritional value you require for a healthy lifestyle.

And who knows, you may even acquire new skills like becoming a great cheesemaker with all the goat milk supply at your disposal.

Rearing animals and growing your food organically guarantees that the food you are eating is clean and healthy, produced from compost manure, watered sustainably, and favorable for the soil profile you have.

Food Stock Expectations

When starting off-the-grid living, one must understand and account for the time that plants and animals will grow and become mature for harvest; This

means that when starting, you must have a plan for the long haul stocking up, allowing yourself time enough to settle in and execute the strategies to start cultivating a garden and rearing easy to manage animals

You can stock up your pantry with canned foods, powdered milk, and preserved meat such as beef jerky to help you make the transition as you start to grow your produce in the homestead. The first harvests may not be as bountiful as you would want due to many factors. The soil in your garden may not be as rich when you first start, but that improves as you till and start growing crops using compost.

You may also be a complete novice in growing plants and rearing animals. But through research and learning from your mistakes, you will soon become quite adept at what to do; and when to do it, leading to better yield down the road.

All things considered, even in the beginning, the food supply from your homestead should sustain you sufficiently if you have made the above plans for food.

In fact, as you begin to sustain yourself from food grown and reared in the homestead, you will quickly realize that producing the food is not the most significant challenge when you have all the essential resources such as water, compost, and good seed quality.

The main challenge becomes how to preserve surplus food so that it keeps during the summer and into the winter.

As you depend on your garden for food sustenance, you must learn how to plant in a cycle that keeps your garden feeding you consistently for as long as the weather seasons will allow. For instance, allocating two portions for lettuce and planting them three weeks apart is a good idea.

Why is that? That’s because the first portion will be ready for harvest in 30 days.

When the first portion is ready, you can harvest from the garden directly as you need by plucking the amount you need for the day while leaving the rest in the garden. By 3 weeks, you may have depleted the first portion, and by then, the next portion is ready for harvesting.

If you plant kales, spinach, broccoli, cauliflower, cabbage, and lettuce at the same time, the lettuce and spinach will be ready before all the others. By the time you and your family finish consuming the lettuces, the kales should be about ready at 55- 65days. By the time you are done with those, the cabbages are fully grown at 70 days and ready for consumption. In between, carrots, onion, and tomatoes also come to maturity for flavoring your meals and providing excellent nutrition for you and your family.

So as you can see, you can have plenty to eat from your garden if you plant as soon as spring hits. A well-planned and successful off-the-grid garden ensures produce does not all yield at the same time.

Being off-grid is all well and good when the climate is favorable, and your garden has plenty of food. But the question begs, what do you do when the weather turns, and your garden cannot produce such bounty? This is where natural food preservation methods come in to save the day and keep you alive at a time of scarcity.

Besides, you need to understand food storage to prepare for eventualities like drought, locust invasions, or floods which you have no control over.

So how can you naturally preserve some of the bounty harvest experienced when the weather is favorable to carry over to the lean times of drought or winter, depending on which region you live in?

Borrow a leaf from ancient civilizations that did not have the benefit of hi-tech technology such as refrigeration to preserve their food; Their reliance on natural methods guaranteed that they remained well-fed even during lean seasons.

When living off the grid, these natural methods are still practical and very applicable even today in helping you keep your food stockpile high, especially when the weather is not favorable for gardening. These methods are as described below.

Canning

For most people, canning is the most popular way of preserving food. The fortunate thing is that today, there are numerous “indefinitely reusable” canning lid options on the market that make this process a whole lot easier.

The idea behind canning food is simple yet fairly effective. Canning food works under the premise that when items such as partially cooked vegetables, fruits, meats, jams, soups, or milk are stored in an airtight jar. It is boiled long enough to kill anything inside that could spoil the contents; the items can keep for a long duration of time.

Canning food items works for the most part. However, when not done correctly, there is the concern of contracting botulism; This is a rare disease that is caused by bacteria known as Clostridium botulinum. The disease causes difficulty breathing, muscle paralysis and can be fatal.

The bacteria thrive in low oxygen conditions like the inside of canning jars. Fortunately, it cannot survive in sugar, acidic solution, or salt; This is the reason why some foods like jam and salsa can be safely canned in boiling water. Items like meats, vegetables, and soups must be sterilized in the higher temperatures of a pressure cooker to ascertain safety. When living off the grid, you want to have a trusted source or manual on how to safely can your food for long-term off-grid storage.

Going to local farmer’s markets can help you learn a thing or two from local farmers who bring their canned goods to sell. Make a farm visit to see the process or take an online course before you make a move to your off-grid home.

Smoking / Salting / Drying

There are two methods of food preservation through smoking: Hot or cold smoking. When living off the grid, butchering an animal should occur perhaps once a week to sustain your protein nutritional needs. Simply because most off-grid living will have no refrigeration, smoking is the next best option for preserving meat.

During hot smoking, the meat is salted and hung in the kitchen rafters to dry and get smoked. The process begins with salting which helps draw water out of the meat. Hot smoking also means that the meat will cook as it is smoked. Salt and the smoke permeate the meat, speeding the drying process and bringing a slight acidic element to the flesh and that helps the meat to keep for long.

Cold smoking means exposing the meat to cool smoke, and the meat does not cook. However, it needs to go through a curing process to enable it to be kept for long.

Drying can be done on a table out in the sun. Just be sure to tie or hood the meat properly on the table to prevent hawks from clawing and flying away with it as it dries out in the open.

Pickling

This age-old art is terrific for preserving vegetables. However, like canning, it poses the danger of causing Botulism. The ingredients used in pickling usually include salt, water, vinegar (acetic acid), sugar, and spices.

The pickling process is pretty straightforward. The food should be cleaned, peeled, and diced, or sliced where necessary, then immersed in a brine solution containing vinegar. Be sure to have a reliable resource on the process to ensure that you get it right and your food keeps without going bad. Equally important, you want to get the process right so that you don’t contact Botulism after consuming a pickled batch of vegetables.

Well stipulated instructions on quantities and ratios from a reliable source will help you achieve the correct pH of 4.6 that pickled storage should have. With that pH, the bacteria Clostridium botulinum has zero chance of survival. It is best to go to a cooking class to learn some of these life skills before moving to off-grid living. The reason for that is because you do not have the luxury of learning on the job due to the wastage and risk of getting ill from poorly pickled veggies.

Only firm and almost ripe fruit or vegetables should be pickled. To give them a good chance at staying preserved, they should not have blemishes such as rot or mold. Below are vegetables from your garden that can be pickled for off-grid storage:

- Asparagus
- Beetroot
- Pears
- Peaches
- Figs

- Garlic
- Capsicums and chilies
- Cauliflower
- Cucumber and gherkins
- Tomatoes
- Onions

During winter, stored food keeps well because the temperatures are low anyway. In areas with barely any winter, and there is sun almost all year round, you can harness solar energy to run a low-tech refrigeration unit.

Root Cellar

Root cellars are underground or partially underground cold damp rooms in which some select foods store very well. Foods that keep well in a root cellar include:

- Pears
- Potatoes
- Rutabagas
- Turnips
- Radishes
- Apples
- Beets
- Broccoli
- Brussels Sprouts
- Cabbage
- Carrots
- Artichokes
- Leaks
- Parsnips

Dry Storage

Dried items such as onions, dried chilies, grains in protective containers, and sweet potatoes can be kept in a dry and cool pantry.

Honey

Storing fruits is just as critical as preserving meat and vegetables. Having a good supply of honey in your homestead will serve many purposes for creating tonics that you can use in the home. It is also helpful in the preservation of fruits when you are off the grid. If you have a freezer in your home, you can glaze the fruit of choice with honey and then freeze it for long-term storage.

Feed Yourself Without Relying on Power

If you do not have electric power in your homestead, a pantry and a root cellar will help you preserve your produce from the garden both in the summer months as well as in winter. As we noted earlier, food preservation in winter is much easier because the temperatures are already low. Therefore, food keeps for longer.

Planting nutritious crops in your garden that overlap each other is the best way to ensure food safety. Apart from your pantry and root cellar that you can use to store your surplus, you can live off the land by picking what you need while leaving the rest in the garden to be consumed another day.

Drying meats, smoking, and salting is another effective way of preserving food for the long term without using power.

Living Off the Land

Living off the land is dependent on where you are settled. Various geographical areas have different advantages and disadvantages to be exploited and overcome. Your property may mean that you have abundant wildlife to hunt, including wild geese, ducks, fish, or deer. It may also mean that there are plenty of fruits, berries, and mushrooms to be harvested just because of the climate and ecosystem that surrounds you.

In other areas, off-gridding may mean farming a garden and rearing animals for your diet and nutrition. In both scenarios, you are living off the land. However, by default, off-gridding means that different weather seasons may offer plenty of food to eat and scarcity in others. The key to living off the land is to know how to spread out your food resources when there is plenty in a way that they carry over to the period of scarcity.

This applies whether you are hunting and gathering or farming crops and rearing animals for your subsistence. Nature can be harsh, but it's also very generous once you learn to understand and work with its laws.

For most people, the discovery of how nature works and the generosity it possesses is often a refreshing revelation once they move off the grid. It makes you wonder why you did not make the switch from city dwellings to the off-grid living way earlier.

The Take-Away

- Part of successful off-grid living is being prepared to become self-sufficient when it comes to feeding yourself.
- Proper long term planning will keep you on a sustainable fresh food supply for a long time
- Consider the climate, ability to compost, and water source situation of your location if you grow your food.
- You can grow crops and rear animals
- Find out about laws governing farming and farm produce in your locale. For example, it is illegal to sell milk from your homesteading venture to other people around you.
- Research on the best food preservation option for your location. For example, drying may not work for wet areas, but salting might.
- Choose the type of food you plant carefully with consideration of the climate and weather. Also, put a lot of thought into the storage options you go with. That will ensure the food remains safe for you and your family's consumption.
- Prepare for living off the land by taking classes on food storage and best planting practices to keep your soil productive for longer. Do not move to an off-grid location without this essential know-how. Investing in this knowledge is investing in your survival.

6

HEATING AND COOLING YOUR OFF-GRID SPACE EFFICIENTLY

> ***"The sun—that power plant in the sky—bathes Earth in ample energy to fulfill all the world's power needs many times over. It doesn't fire off carbon dioxide emissions. It won't run out. And it is free."***
>
> — SUSANNAH LOCKE

Throughout the year, you need cooling and heating to stay comfortably in the house. That applies even when you are living off the grid. So how do you live off the grid with the comfort of everyday cooling and heating through all seasons?

There are five ways to have the best heating and cooling while living an off-grid lifestyle. They include:

- Passive solar design
- Solar-powered air conditioners and heating pumps
- Roman-style water cooling
- Ground cooling loops
- Heating and Cooling by Passive Solar Design

Let's start with the passive solar design because it is by far the simplest option. To begin with, all you have to do is consider the placement of the windows in your space.

Heating and Cooling with Passive Solar Design

Earlier, this book highlighted how you could place the solar panels on the south side of your roof to capture the most solar energy. Now you can place fewer windows on that side and have plant cover to prevent the sun's heat from overwhelming you.

If you get this placement correct, you do not have to worry about cooling because the sun will always stay in the same place, and your house isn't moving either.

All you have to do is to minimize energy use without having to expend any other energy. Good design and insulation in the walls alone can keep a building cool and comfortable.

Use temperature regulating materials to help you control the temperature in your house.

Here are four elements of passive solar design for this approach to cooling and heating to be successful.

#1 Properly Oriented Windows

It is best to have the windows facing off the true south by five to ten degrees. That means the solar efficiency of the window decreases, leaving the house a lot cooler.

If your windows are within 30 degrees of the south-facing face, you are likely to experience a lot of heat between 9 am and 3 pm. To mitigate the heat during summer, you can use trees and plant cover to shade the area.

To make the most of natural light, you should consider north-facing windows. But for comfortable heating and warmth, a southwest-facing window orientation will work well. This orientation combines a little sun and warmth that filters in from the south and soft light and cool temperatures from the west. As a result, you can enjoy a temperature-regulated space.

Depending on how you would like to regulate the temperature in your home, here is a small guide to follow in window orientation.

North facing windows: This window orientation means that you have little to no sun coming into the house. The space will be evenly lit, but it will also appear darker than other rooms in the house. If you do not want to experience too much sun, this is the perfect window placement.

South-facing windows: This orientation floods your house with tons of sunlight and warmth. It makes the space the brightest and hottest in the daytime. You can expect the temperature to be high in your house if you have some south-facing windows.

East/West facing windows: The sunlight pours through east and west-facing windows early in the morning and evening as the sun rises and sets. However, during the day, the temperatures are cool with warm golden tones. The golden tone persists in this room throughout the day.

East facing windows: your space will be warm in the mornings as the sun rises but cool down as the day progresses.

West-facing windows: This type of window allows sunlight during the day and becomes warm as the day progresses and the sunsets.

#2 Heat Distribution Mechanisms

Solar energy is typically transferred all over the house by convection, conduction, and radiation. A passive design uses these three natural methods exclusively without adding an air conditioner that runs on electricity.

Conduction is where the heat from the sun travels through objects in contact with each other. For example, between your feet and a sun-warmed floor.

Radiation is whereby you feel the sun's warmth radiating from a sunny window or a sun-kissed wall even if you are not in direct contact with it. The heat retained by the wall or window warms the home as it radiates some of the heat trapped within the air.

Convection is the transfer of heat through air or fluid into the rest of the house. Some people use a blower, ducts, or fans to distribute the heat throughout the house.

#3 Thermal Mass

Thermal mass refers to heat absorption from sunlight during hot months and similar absorption from warm air during cold months. Masonry is one of the primary ways to achieve excellent thermal mass in a moderate climate. If you use heat absorbent masonry material like concrete, brick, stone, and tiles, you do not need to invest in additional thermal storage regardless of the year.

You can use the mentioned masonry material in conjunction with other thermal mass materials like water. The water can store and distribute heat throughout your space, depending on the time of the year. For example, you can have water pipes with heated water passing under your tiles to heat the floor. We will look further at how this geothermal concept works in the geothermal concept of HVAC.

The water can be heated underground through geothermal and distributed into underground ducts strategically placed under the house.

If you want to use natural thermal mass in your passive design, you should consider things like how dark or light your walls should be to facilitate the absorption of sun rays. Dark-colored walls and furnishings tend to absorb heat better, making them better conductors for thermal mass.

Avoid anything that will shade the thermal mass material from absorbing heat. For example, do not have any plant cover on walls that you would like to use as a thermal mass material. In a moderate climate, you can get away with using furnishings and drywall to achieve sufficient thermal mass, eliminating the need to use walls or intricate underground water pipe systems.

#4 Control Mechanisms

These are mechanisms that ensure that you control the amount of heat and light entering the house. Roof overhangs can offer shade, especially to south-facing windows mitigating the amount of sunlight and heat getting into your space.

Another option is using a differential thermostat that alerts you to high temperatures and signals a fan to go on and cool the space. Some people prefer to use insulating shutters, low-emissivity blinds, or vents that restrict heat flow.

These mechanisms allow you to create a sustainable passive design.

There are three concepts of passive solar design.

1. The sunlight enters your house through the south-facing windows and heats the masonry (floors and walls). The masonry absorbs the heat and stores it to later release it as the temperatures cool in the evening and night. The stored heat warms the air in the house naturally. It is called the direct gain passive solar design. Some homeowners incorporate water-filled containers to absorb and store the solar heat because water stores two times more heat than masonry.
2. The sunlight enters your home through the south side, but it encounters a Trombe wall. That is an 8- to 16-inch-thick dark-colored wall that stores the heat in its mass. The heat then slowly radiates into the living room, heating the room. Since heat travels through masonry at an average rate of one inch per hour, you will begin to feel the heating effects in the evening if the heat is absorbed late morning to late afternoon. A single or double glass mounted an inch or less in front of the Trombe wall absorbs the heat before migrating it into the wall. It is known as the indirect gain passive solar design.
3. Alternatively, you can opt to build a sunroom, also known as a solarium or solar room. That is a space with operable openings like doors and windows to allow heat into the room. They make a pleasant space for relaxing and soaking up the heat, and you can also grow a plant or two. It is commonly referred to as an isolated gain passive solar design.

Heating and Cooling Using Solar Powered Air Conditioners and Heating Pumps

A solar-powered air conditioner or heating pump relies on electric current produced by photovoltaic panels, which harness solar energy.

These air conditioners and heating pumps use direct current, which comes directly from the PV panels. That means that there is no current conversion from DC to AC, which typically results in power loss.

A small home off the grid can use three solar panels of 320 watts each to power the air conditioner.

If you want to use solar-powered air source heat pumps during the cooler season, you need solar panels that give you between 500 to 1400 watts each, depending on your needs.

Did you know that a standard air-source heat pump can use 50% less energy than a window air conditioning unit?

Heating and Cooling Using Roman Style Water Cooling

The Romans suffered unbearable heat between July and August. So they had a “frigidarium,” a large pool of cold water to help them cool down. In our modern setting, we can use a pool to cool down during the day. An outdoor swimming pool with regulated water temperature is an excellent option.

The good news is that cool water from the pool has a way of cooling the immediate surroundings. If you live near a river, lake, pond, or dam, you will notice this more because the winds passing over the water surface are cooled, bringing a breeze with them.

The most sophisticated cooling method in Roman society was pumping water through the walls of their houses to keep the interior cool during the summer months. But this was a privilege for well-off Romans. The rest of the population had to contend with snow shops and frigidarium.

Romans indulged in eating snow to cool off. Wealthy members of society kept snow at home for this purpose, but ordinary citizens would go to the snow shop for a quick fill.

That is similar to using ice cream, a cold drink, or chomping on crushed ice.

Heating and Cooling Using Ground Cooling Loops

Four to six feet underground, the temperatures remain cool and constant all year round. A buried system of pipes connected to an indoor handling unit creates what is known as an earth/ground loop.

The pipes are buried underground horizontally or vertically, and they may be fed by water from an underground aquifer. The water is heated by the stored heat absorbed by the ground from the sun. The heated water makes its rounds throughout the loop in the house, and then it is reinjected back to the same aquifer it came from.

These geothermal HVAC systems do not typically require electricity or fossil fuel to generate heat.

In the winter, they simply use heat naturally stored in the ground to heat the water. In the summer months, these systems pull heat from the building and deposit it in the earth or the aquifer. Those units that require electricity consume very little of it.

Unfortunately, a geothermal HVAC system can be costly to install. But with time, they pay themselves back.

Geothermal HVAC systems are becoming more popular as part of the green building movement dedicated to building eco-friendly homes.

Types of Ground Loop Systems

There are two categories of ground loop systems: Open and closed ground loop systems.

Open-Loop System

There is only one type of open-loop system. It extracts water directly from your well or artificial pond and runs it through a water-refrigerant heat exchanger found in the geothermal heat pump unit.

Heat is transferred from the heat pump to the water before expelling the water back to the pond or well to heat the house.

This system is also known as the pump and dump loop. Local environmental personnel must be consulted when installing this type of system to ensure the installation is per the local laws.

You may encounter problems with this system if the water quality is poor. That means the water features too much dissolved solid content or high mineral content.

This type of ground loop works well when there is plenty of underground water.

Closed-Loop System

This system comes in three formations

1. Horizontal Closed-Loop System

The horizontal closed-loop system requires lots of space because of its sprawling design. The pipes can go for hundreds of feet horizontally and six to ten feet deep. This system works for people living off the grid in remote areas with lots of land to work with.

Also, you have to ensure that the land can accommodate trenches. Rocky areas are not a good fit for this type of ground loop system.

The ground is dug up with trenches going five to ten feet underground. A series of small plastic pipes is entrenched. The pipes have a geothermal heat exchanger to facilitate the heating and cooling process.

2. Vertical Closed-Loop System

This system features pipes running vertically instead of horizontally, and it works for people with limited land sizes. The installers digs one or more boreholes, each around 200 or 500 feet deep into the ground. The boreholes must each be five to six inches in diameter, and they should be 20 feet away from each other.

The next step is to insert a pipe connected at the bottom by a u-shaped bend to create a loop. The vertical looped line is grouted then connected to a horizontal pipe. The horizontal pipe is placed in the trenches and connected to a geothermal heat exchanger.

Due to grouting, contact between the pipe and the earth is guaranteed, meaning heat will be constantly transferred to the water in the pipes to heat your space.

You will encounter vertically closed-loop systems in schools and commercial buildings because of the limited space. However, this ground

loop system is more expensive to install than its horizontal counterpart due to excessive drilling.

3. Pond/ Lake Ground Loop System

This option works if you have a water body on your land. The installing team runs a supply pipeline from your house and underground into the water; The pipework coils into circles that run at least eight feet underground. That depth eliminates the chances of the water freezing.

However, the pond or lake must meet local minimum volume, quality, and depth requirements before the installation of the coiled pipework.

This ground loop system is the cheapest option.

Advantages of Using Off-Grid Heating and Cooling Solutions

Affordable

The good news is that the solar panels pay for themselves after a while because they save you a lot on your electricity and other utility bills. Generating your electricity mitigates the amount you spend on bills throughout all the seasons.

Once you have finished paying for the solar panel system, your electricity production is completely free. So it doesn’t matter if national oil and gas prices go up, impacting the cost of electricity. You are exempt from the price hikes.

Eco-friendliness

Traditional heating and cooling methods can release greenhouse emissions in their operations, especially if they run on fossil fuels. Pair the solar panels with your air source heat pump to cool and heat your home with little to no carbon footprint.

In the United States, most of the electricity on the national grid uses fossil fuel. But, by using solar-powered cooling and heating systems, you reduce reliance on fossil fuel and reduce pollutants and emissions in your little corner of the world.

Incentives

Most governments, state, and private utility companies offer incentives to people who produce and use clean energy. The incentives can be rebates on previous bills or financial payments. You can find out what tax credits or production-based incentives are available in your local area.

Myths about Ground Loop Systems

Geothermal HVAC heat pumps make a lot of noise

These systems are typically quiet. Besides, they are located outside and underground, where any sound would be muffled.

They have a short service life

This myth is perpetuated; there is a higher likelihood of deterioration due to the elements by the belief that by being underground and outdoors. However, ground loops can last for decades without any further intervention in the running of the system. There are new guidelines in place to ensure the complete efficiency of the system. The materials used include durable plastic that can weather the elements for years.

Geothermal HVAC use a lot of electricity

These HVAC systems use one unit of electricity to move five units of heating and cooling from the ground to your house. That is highly efficient.

Geothermal HVAC systems can remove more kilowatts of electricity consumption from the electric grid compared to solar and wind energy.

The systems only work in heating mode

They work in both cooling and heating mode. These systems use loops and lines in the ground for this purpose.

They use a lot of water

These HVAC systems do not use any water. For example, if the water is derived from an aquifer, it is returned to the exact aquifer after running through the pipes. This process is known as re-injection.

The Take-Away

- Cooling and heating can be achieved without using electricity which is cheaper in the long run.
- Decide on which cooling or heating option you would like before you begin building your house.
- Look out for incentives in your locale that apply to some of the HVAC solutions you have in mind. Rebates and the like can save you some money.
- Solar and geothermal HVAC systems tend to have very high installation expenses, but they eventually pay themselves back.
- Take advantage of the benefits of off-grid heating and cooling solutions to mitigate the high cost of utility bills.

7

THE BEST WASTE MANAGEMENT PRACTICES OFF-GRID

> ***"I have become quite good at repurposing and reusing much of what comes into the house. The goal is to generate as little waste as possible."***
>
> — ANNA GETTY, PHILANTHROPIST AND ACTIVIST

Life off-the-grid allows you to repurpose almost anything to be used for something else. That leads to minimal wastage of virtually everything. When resources are not as abundant as they might have been when you lived on the grid, you have no choice but to think outside the box and live with utmost frugality. You can be frugal and still have plenty of food and a homestead that looks great, clean, and green.

On the grid, waste management is a challenge for almost any city. Given the high-density populations that generate loads of waste every day, it is not surprising that vast mounds of garbage are visible outside cities where the trash is disposed of.

These massive garbage heaps often become unmanageable, foul the surrounding air for several miles and become a cesspool for disease, all while contributing to global warming. This occurs because when such massive heaps of trash decompose in a landfill, they release lots of methane gas.

Methane is a potent greenhouse gas that plays a role in heating the planet. Eliminating this gas at the source by cultivating habits such as composting

is very effective in conserving the environment.

Most city dwellers who have become conscious of these environmental challenges have adopted the concept of recycling to clean up the environment and leave decent and healthy earth for posterity.

When living off the grid, waste management becomes far much easier, depending on how your homestead runs. Food leftovers are fed to animals such as poultry, pigs, and rabbits, and plant residue is used as biomass.

Most of the remaining organic material in the trash are remains that are out in the pit to become compost manure in a few days. When ready, the compost manure is then fed to the garden to enrich the soil and nourish the plants for robust health and yield. The recycling concept also applies in a homestead environment for items such as plastics and glass bottles.

And, because you are aware of your environment, you also make organic choices that can undergo natural decomposition and leave little to no carbon footprint.

Conservation and efficient use of water in a homestead is a part of the puzzle that needs solving to live off the grid successfully. Forming a system that utilizes gray water for your lawn, live fence, or garden sees to it that your homestead remains green, beautiful, and productive even through dry periods. You can do so by raising the efficiency of your water usage and conserving your clean water.

In this chapter, we shall explore how you can utilize waste in a way that enriches your homestead and conserves vital resources such as water and the air.

Trash and Composting

When living off-grid, keeping your costs low and using materials at your disposal to create solutions to common problems is at the center of off-grid living. Growing your food is crucial to your survival.

Composting then becomes a vital part of your homestead’s ecosystem that keeps your compound and household clean while generating essential manure for plant growing and soil enrichment.

Did you know that organic wastes, such as yard and food waste, account for 25 to 50% of what you throw away? You may not be able to compost all of the organic waste you generate, but composting does significantly cut down on your overall trash.

Frequently asked questions about composting include:

- *What exactly should be thrown into the compost pit?*
- *What shouldn't be thrown into composting manure?*
- *How long does it take for composting materials to be broken down and be ready for use?*

We shall answer these questions further in the chapter but first, let's see how you would go about setting up a compost pit in your yard.

You don't need any specialized training to set up a compost pit. The first thing you need to do is choose a suitable site in your compound where you can dig a pit. The pit can be any size, including 3 x 5 feet with a depth that goes one to two feet deep. It is as simple as that. It should not be too deep.

A shallow depth allows you to manage the compost with ease on occasions when you need to turn and aerate the heap. The alternative to digging a pit is to build a compost bin that can either be stationary or portable, depending on preference.

A pallet bin is also a great idea. However, you must be mindful of changing the bottom pallet every one to two years because of rot. The side panels can be replaced as needed, but they will last anywhere from four to six years before you have to do any replacing. Digging a compost pit, on the other hand, offers less maintenance.

There are several general rules to observe to achieve a good outcome when setting up a compost pit for your homestead.

- Choose a site that is not too close to the house but also not too far away. That ensures that the occasional odor coming from the pit does not foul the air in your house. On the other hand, the trip to

the compost to dump litter should not be too long for the sake of convenience.

- Install the compost pit in well-drained ground that is level and near a water container. You can always put a drum filled with water next to the compost pit. That makes it easy and convenient when you need to pour water into the pit to keep it moist.
- The area where you set up the compost pit should be free of shallow tree roots for a uniform composting process.
- As you pile material into the pit, remember to moisten the pit's contents by occasionally adding water to the pile. If you have water close by, such as a tap or drum full of water, the chore becomes less tedious and keeps your compost moist with little effort. You should also ensure that you form a concave space in the middle to capture rainwater when it rains.
- The ideal moisture level of a compost pit should resemble the moistness of a wrung sponge. In the rainy season, it becomes a good idea to cover your compost pit with a polythene cover to prevent excess moisture.
- It is good practice to turn the compost heap once every week. That keeps the pile well aerated, promoting decomposition while minimizing putrid smells.
- A heap of compost is ready and fully decomposed in 3-6 months. By this time, the pile's contents are sweet-smelling, crumbly, and assume a dark brown almost black hue. Another indication that composting is complete is a rise in the temperature of the heap that shoots up from 48 to about 66 degrees centigrade.
- While you can use the compost directly from the pit, you should remove the manure from the pit and let it age for a month before use in your soil or on your plants.

If you are new to composting, you are likely to run into a few challenges. These are the most common ones you can expect to face and how to overcome them.

Bad Odor

This is a common problem with compost heaps. It usually means that your pile is not well aerated, and the moisture level is low. If your pile appears

dry, moistening it by adding water to the pile helps resolve the smell issue.

Turning the heap once a week will ensure that the aeration is good and will play a part in alleviating strong odor from the heap. The odor attracts all manner of flies. By doing the above, you will also be discouraging flies from your compost. You can also add more browns to the heap to control smell

The Pile is Too Wet

In case of excess rain that results in too much moisture in your compost heap, you can add more browns to the pile and turn more frequently to help the water get absorbed and dissipate to acceptable moisture levels.

No Decomposition

If you notice that the contents of your heap are not degrading, then you need to rectify one or several of the following things; turn the heap more frequently, at least once a week. Adding more greens will help catalyze the decomposition process.

Ensure the moisture levels are good by either adding more water to increase moisture or adding more browns and turning it frequently to lessen moisture. Adding urea, fresh manure, or blood meal to the pile can also act as a catalyst to degrade the pile.

Compost Not Getting Hot

The degrading process will naturally cause a rise in temperature in your pile over time. If your compost is not getting hot, it means that your heap is too small, and therefore, you need to pour on more materials to increase the size of the heap.

Pets

If you have pets like a dog or a cat, they are likely to frequently visit the pile for a chance at spotting a piece of meat or bone. To prevent pets from accessing the heap, you can cover the top of the pit with a pallet, or you can take to burying foodstuff at least a foot deep into the pile.

Insects

Insects love a heap of degrading material. To prevent an influx of insects from setting up shop on your compost pit, be sure to keep it moist and turn it in more frequently.

Now we revisit the questions posed earlier.

After how long is your compost ready for use?

The answer is three to six months. When throwing items for composting into the pit, you need to ensure that they are in small pieces or sizes to lessen the time it takes to break down and fully degrade or decompose.

The other common question concerns the material you should dump in your compost heap. Here's an exhaustive list of what can go into your compost pile;

- Inedible plant materials such as flowers, twigs, and leaves due to trimming the hedge or fence. Items such as banana peels, corn cobs, and grass clippings are suitable for your compost. Just be sure to chop them into smaller pieces before adding them to your compost heap.
- Fruits and vegetables
- Non-recyclables such as shredded paper
- Used paper products such as napkins, tissues, towels, and plates.
- Eggs and eggshells
- Natural loose fibers such as hemp and jute
- Nuts and grains
- Coffee grinds
- Teabags
- Cardboard
- Bread
- Pasta
- Rice
- Chips

A common misconception when it comes to composting is the difference between compostable and biodegradable items. Most people misconstrue this to mean the same thing. Biodegradable items can be broken down by

the soil, even if it may take a long time to do so. They include items like paper and cardboard. These items are also compostable when cut down to smaller pieces.

When composting natural paper products, it is essential to leave out glossy papers. That's because the glossy paper has an overwhelming amount of chemicals that take far too long to break down and may end up negatively affecting the quality of your soil as well as your plants.

Therein lies the difference: Glossy paper is biodegradable but not ideal for composting, while regular paper is biodegradable and excellent for compost. Just because a material is biodegradable doesn't mean it is a good choice for composting.

When living off the grid, what items should you consider keeping out of your compost and why?

There are a few animal products that are compostable, but you may want to think twice before throwing them into your compost heap. These include cheese, milk, and meat or meat products.

These products result in a putrid smell as they decompose, which attracts tons of flies and rodents. Other items to avoid in your compost heap include the following;

- Animal waste such as that of dog and cat feces─ That's because they develop a foul smell and often contain parasites, and play a role in attracting pests such as rodents.
- Yard trimmings may be compostable. However, if they have chemical pesticides, it is best to avoid them because they will kill beneficial composting organisms in your heap
- Coal ashes feature with excessive amounts of sulfur and high iron content to damage plants

Here is an exhaustive list of what not to throw into your compost heap;

1. Meats of any sort such as poultry, fish, and so forth.
2. Dairy products milk, cheese, and yogurt.

3. Animal or human feces and urine should not be composted.
4. Any item with inseparable plastic/ metal/glass or rubber.
5. Styrofoam.
6. Items made from rubber or latex such as rubber gloves or condoms.

Other items that are likely to form part of your trash and should not find their way into the compost but should be recycled instead include the below:

1. Aluminum cans.
2. Glass bottles.
3. Plastic containers.
4. Plastic bags.

How does composting stand to serve you when living off-grid?

- It helps keep your compound neat and clean.
- It increases organic matter in your soil.
- It promotes the absorption of nutrients in the soil and in the plants in your garden.
- It improves aeration and drainage in clay soils.
- It helps sandy soils retain water that normally runs through.
- It makes clay and other soils more friable. That translates to a garden with improved soil that's easier to crumble and dig in.
- It contributes to the pH balance in your soil.
- It helps control soil erosion
- It extends the growing season by moderating soil temperature.

Gray Water

In many cases, when living off-grid, water is often one resource that can become scarce and should be managed with utmost care. Whether you harness rainwater, dig a well or use a nearby river or lake, water conservation in a homestead is paramount.

We have already established that, indeed, water is life. For that reason, you will find that for you to be happy and in a position to carry out other chores that keep your homestead in the state that you desire, water is at the very heart of sustaining your life and all in the homestead.

That includes the crops in your garden and the animals that you rear. Since the water demand is high, tapping into a system that helps you recycle some of the used water from laundry and the kitchen to cater to needs like cleaning the driveway, watering a live fence, and watering the garden can help conserve your freshwater reservoirs. Adopting such a practice will significantly minimize the overall amount of liters you consume in your homestead.

That brings us to gray water. What is gray water? This is gently used water from your homestead's kitchen, bathroom, showers, washing machine, and tubs. It is essential to note the distinction between gray water and black water.

Simply put, the distinction between the two is that black water is water that has come into contact with feces, either from the toilet or from washing diapers. In contrast, gray water is from the above-mentioned sources, such as the kitchen and bathrooms, and has not come into contact with feces.

Gray water will contain varying degrees of soap, food particles, hair and will look "dirty." However, this water can still be repurposed for safe use in the homestead instead of being sent and lost directly to the sewer. Keeping gray water out of the sewer or septic system reduces the chance that it will pollute local water bodies. Gray water can be repurposed to water the yard and flush the toilet(s) in the house.

The idea of using gray water is to help conserve your freshwater resource in your off-grid home. If you stop to think about it, you will realize that the shower and laundry take up most of your freshwater. Here's a table showing the general breakdown of how freshwater is used in an average off-grid home.

Section of house	Water usage
Bathroom	50%
Laundry	22%
Garden	19%
Kitchen	8%

As you can see, harnessing gray water from the bathroom and laundry area alone for watering the yard and the garden can positively help you conserve your freshwater. Using gray water will also help you cut down on the cost, energy, and effort of fetching freshwater, especially if you use a pump to pull the freshwater from a well, river, lake, or dam.

Just for clarification, as we have pointed out, gray water is not clean or freshwater. If it runs off to the river or lake, it is a pollutant owing to the various soap and detergent chemicals it carries from human use. Chemicals in gray water are dependent on how harsh and toxic the soaps you use are. Gray water can be harmful to your plants and your yard.

The solution to this is to use mild soaps that have fewer chemicals and are environmentally friendly. Occasionally, water your garden and yard with fresh water to help the soil break down the process of the trace chemical

found in gray water. In the rainy season, give your yard and plants a break from the gray water.

In dry weather, gray water comes in handy in keeping your garden and compound lush without depleting your freshwater resource. For as long you use organic soaps, the gray water from your house is absorbed into your yard and garden without harming the plants.

Ideally, gray water should flow toward fruit trees and ornamental plants in the yard. When directed to the garden, the water should only touch the base of the plant and into the soil. The soil will be able to break down the gentle chemicals. Toxic soap residue in gray water can overwhelm the soil with chemicals and ruin your plants. If you intend to use gray water for your garden and yard, use environmentally friendly soaps for your laundry, dishes, and shower.

Simple Gray Water Systems

When living off the grid, systems that conserve your water work to your advantage and help you to manage other resources such as energy and time efficiently. Gray water systems can be low-tech and inexpensive or highly sophisticated and expensive depending on what you want to use them on and for.

Drum or Barrel System

This system is low cost, and you can install it yourself with relative ease. All you need is a drum or barrel that is placed strategically out of the house where your laundry machine drains the wash water.

The drum connects to an outlet hose which goes all the way to the yard and can be held to plants for manual watering. The water can also be used to water your lawn. It is recommended that you strap the drum to a wall or strong post for safety purposes. That prevents any accidental toppling of the drum.

Washing machines are excellent sources of gray water for two reasons; water volume and pressure. Given that washing machines have an internal pump that automatically pumps out the water, the water surge or pressure that results can work to your advantage. You can do that by ensuring your

system does not connect into the existing plumbing but goes right into the drum, through the outlet hose, and directly diverted into the yard or selected trees and plants of choice in your compound.

If your house is on the upper side of a gradient and your yard below, this works perfectly. In addition to the surge generated by the washing machine dispensing the laundry water, the gray water will flow by gravity to the desired areas of the yard.

However, with this method, you will have to manually hold and constantly move the hose over the plants you want to water. The upside is, this system is simple to install, low cost, and hardly requires any maintenance.

Landscape Irrigation System

If you prefer a more automated system for irrigating the plants in your yard, then the laundry to landscape system should help make use of gray water from your laundry. This system automatically diverts the water to selected sections of the lawn or garden of specific plants based on how you have set it up.

The beauty of this system is it does not interfere with your existing plumbing. The installation is pretty simple and straight forward allowing you to do it yourself. You will directly attach the washing machine drain hose to a diverter valve; This offers you flexibility and control over where you want the gray water to go. When the weather is hot and dry, the gray water is beneficial as you can direct it towards the yard or specific plants through the diverter valve.

When there is plenty of rain, you can divert the gray water directly to the septic or sewer system. That allows your yard and garden to breathe, flourish and enjoy the freshness of rainwater. This gray water irrigation system utilizes a 1″ tubing with 1/2″ outlets for directing water to specific plants. If you want a decent element with low tech flexibility for irrigation, this gray water system is a good choice as it is easy to set up, low cost, and requires minimal maintenance.

When it comes to low-tech and low-cost irrigation systems, you want to avoid components like filters and pumps for as long as your setup and the land gradient allows you to.

Kitchen and Bathroom Gray Water System

As you can see in the table above, these two areas generate a decent amount of gray water that can be directed into watering shrubs and trees in your yard. Gray water from the kitchen is rich in organic material such as greases and food particles, while water from the bathroom may have hair.

The particles will quickly clog up your system over a short period and will force frequent maintenance issues. To avoid clogging, a branched drain system with mulch basins is recommended. Since the kitchen and bathroom do not generate too much water, you can opt to harness the water from the two areas using one system.

In this system, you can opt to use 1″ and 1/2″ size drainage pipes. Use gravity on a slope with a ¼” drop for every foot traveled horizontally. Because the water goes through plumbing fittings that split the flow, it is divided into smaller and smaller quantities which helps prevent blockages.

Your trees and shrubs will remain evergreen even in drought periods because their root zone is continually being fed by gray water throughout. The only glaring con to this system is that it consumes a great deal of time when setting up. But, the upside is that very little maintenance is required once complete.

For off-grid homes, gray water systems are meant to conserve water and maximize the efficiency of water usage. The above options are low-tech but practical and effective with low-cost installation.

If your yard is sloped with your home being uphill and everything else downhill, we recommend that you consider using gravity to transport gray water through your system to the yard and garden.

If your land is sloped uphill with your house at the bottom of the slope, or your land is flat, then you have no option but to employ the use of filters and pumps. While pumps work well and are a solution, they do add to the cost of running your homestead, and they will inevitably break down from time to time.

If the lay of your land allows it, it is best to avoid them altogether. But, if the gradient of your land does not favor gravity, then you have no choice

but to incorporate pump(s) into your gray water system.

Everything You Need to Know about Gray Water

While gray water will alleviate the pressure of freshwater use in some instances, it is essential to note that it is to be handled differently from freshwater. Below are some of the guidelines to adhere to when using gray water in your off-grid home.

- Do not store gray water for more than 24 hours. That's because the organic particles, dirt, and chemicals from the soap will start to break down and emit an unpleasant odor. For this reason, it should be used immediately or within 24 hours.
- This type of water is not fit for humans or animals to drink. As such, your system should be designed in a way that allows the water to soak into the ground without pooling.
- Match our gray water system to the irrigation needs of your yard and plants.
- Ensure the water does not pool anywhere in your compound to avoid creating breeding grounds for mosquitoes.
- Avoid pumps and filters in your gray water system. The simpler the system, the better because of low cost, ease of maintenance, and durability.
- Installing a 3-way valve is recommended for easy switching between the gray water system and the sewer.

Septic System

The reason why living in urban areas is known as on-grid living is because most basic and vital utilities are tied to the grid. That means utilities such as water, electricity, and sewage systems are part of public facilities served by the government. Naturally, you will receive a weekly or monthly bill for the above services.

Living off the grid means that you have to find a solution for your water, energy, and sewerage. One of the solutions to the latter lies in installing a septic tank that collects and disposes of your wastewater. A septic tank can be a metal tank or plastic tank that is placed underground for that purpose.

There are numerous types of septic systems such as;

- Conventional system.
- Aerobic system.
- The recirculating sand filter system.
- Chamber system.

The septic tank system that will be suitable for your off-grid home will be determined by several factors that include;

- Soil type.
- Lot size.
- Site slope.
- Household size.
- Weather conditions.
- Water bodies in the immediate area.
- Local regulations.

A septic tank works by collecting water in a metal tank and then being acted upon by bacteria. The bacteria break down everything in the tank resulting in the natural separation of the waste into a bottom sludge layer, top scum layer, and liquid in the middle layer. When new wastewater flows into the tanks, the liquid in the middle layer flows out of the tank into underground perforated pipes that run a distance into what is called a drain field. In the drain field, the released water is absorbed and treated by the soil.

Septic tanks are excellent off-grid sewer solutions. However, they do need a thorough inspection and maintenance by a professional once a year. If you have an efficient self-cleaning system, maintenance can be every three years.

Advantages of a Septic Tank

- Environment friendly because they do not need power or chemicals to clean the wastewater.

- You are in charge of the upkeep and maintenance of the sewerage system.

You want simple systems that are easily manageable and require minimal to no maintenance. That keeps your cost of living low and allows your homestead to function seamlessly. A good and efficient septic system is of utmost importance for a healthy off-grid space.

Outhouse

Depending on where you are from, it can be easy to confuse an outhouse with a latrine. But then again, these toilets share some similarities. A latrine may comprise a trench or dug-out pit for waste disposal.

It can have a bench or stone seating that can serve multiple individuals simultaneously. The unit housing can be made from wood or other building materials, depending on how temporary the latrine is. In some cases, the pit or trench is not housed. That concept was popular with the military decades ago.

Outhouses, on the other hand, take after the same concept of a deep pit for waste disposal but offer more privacy. The outhouse exterior can also be made from wood. The seating area has a hole in the middle and is designed for one person hence the privacy aspect. When the pit is full, the housing or shell can be transferred and placed on a freshly dug pit.

An outhouse is a practical and hustle-free low-cost option when living off the grid for several reasons, as outlined below:

Advantages of Outhouses

- No need to flush.
- Saves on water.
- Easy cleaning.
- Odors are kept outside.
- Little to Zero maintenance.

Composting Toilet

So what is a composting toilet? It is an environmentally friendly sewerage option that is waterless and requires no plumbing. The composting toilet device effectively turns solid waste into compost by creating an oxygen-rich environment that allows aerobic bacteria to break down waste.

For an off-grid setting and for someone who is environmentally conscious, a composting toilet is a practical solution to waste disposal. One of the misgivings that people may have about a composting toilet is the aesthetic of the units.

However, modern composting toilets look very much like a conventional toilet and therefore bode well in with a décor of a conventional modern bathroom. Such a design is self-contained and houses the entire composting system.

This is ideal for a household that does inhabit many people. You can also use it in a small home, boat, or RV. A point of consideration is that this composting type of toilet has to be emptied by hand.

The second type of composting toilet is referred to as the central or remote toilet. In this version, the composted material does not have to be emptied by hand; instead, this version diverts solid and sometimes liquid waste to a remote composter situated elsewhere on the compound.

This option is ideal for bigger off-grid households and can even serve an off-grid compound with several homes and multiple toilets as all the waste is directed to a central compost pile or septic tank of sorts.

Irrespective of which composting toilet you settle for in your off-grid home, both work using the same composting principle that is waterless and odorless. But, for composting to happen seamlessly, the conditions have to be favorable for the aerobic bacteria to thrive and break down the waste. Favorable conditions for aerobic bacteria mean:

- Optimal moisture levels
- Optimal nitrogen levels
- Ideal temperatures of 60-100 degrees Fahrenheit

You will notice that most composting toilets will tend to have a separate urine compartment that is emptied once it fills up or may have a drain pipe that drains the urine elsewhere or incorporate a mechanism to evaporate the urine.

Proper disposal of urine helps keep and maintain optimal moisture without wetness and manages the nitrogen levels in the composting chamber.

Wetness and high nitrogen levels in the composting chamber will kill the aerobic bacteria, and therefore, the waste will not be broken down, leading to odor in the toilet.

Modern composting toilets are easy to use because they come with sensors, thermostats, and automatic mixers that make it easy for you to ensure optimal conditions are maintained for the composting process to work as needed.

You can use this toilet just as you would a regular toilet. The difference is, instead of flushing using water, as is the case of solid waste, you will need to turn the handle at the base of the unit. Spray the bowl with a mixture of water and vinegar whenever it gets dirty.

Advantages of composting toilets

- Easy to install.
- Eco-friendly.
- Save on water.
- Odorless.

Modern times have come with many innovations that make off-grid living quite possible and manageable. For many people, the idea and concept of off-the-grid living are becoming more appealing and a real possibility. A good number of people work online anyway and can live anywhere where there is an internet signal. Escaping the high cost and tyranny of urban life is no longer impossible.

With such water conservation ideas, you can maximize;

- Repurposing gray water.

- Growing your organic food on the cheap by utilizing compost manure from household trash.
- Having a sewerage system that is affordable and eco-friendly.

The Take-Away

- Make arrangements for your sewerage needs before you move to your new off-grid home.
- Choose the best option depending on your immediate needs.
- Ensure you choose the right location for your septic tank, compost toilet, or outhouse to avoid water contamination.

FINAL WORDS

Living off the grid is not for everyone. It requires dedication and discipline. But, the benefits are irrefutable and life-changing.

In this book, you get to learn how to survive off-grid as you begin this life-transforming change; How to look for the best location for your needs, what type of off-grid lifestyle is best suited to you and how you can live sustainably off the land.

Make no mistake; this resource doesn't guarantee that off-grid living will be easy. However, it does make it clear that you can do it and how you can achieve a successful off-grid life.

Use this book every step of the way to learn more and research what you need to do before making the transition. Make visits to some of the off-grid places mentioned in the book where possible and see how others are making it work for themselves.

There are many off-grid communities in and out of the United States that love sharing their lifestyle with potential off-gridders. Alternatively, you can make Airbnb arrangements to experience the different off-grid lifestyles.

As you contemplate this journey, let these words from Abraham Lincoln, the 16th president of the United States of America, inspire you:

> ***“The greatest fine art of the future will be the making of a comfortable living from a small piece of land.”***
>
> — ABRAHAM LINCOLN, THE 16TH PRESIDENT OF THE UNITED STATES OF AMERICA

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