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ENVIRONMENT

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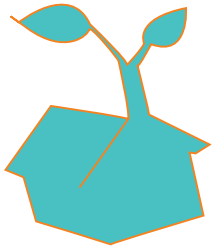

HANDBOOK OF TECHNICAL FACTSHEETS

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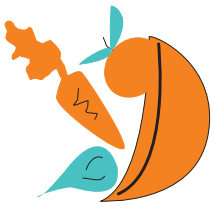
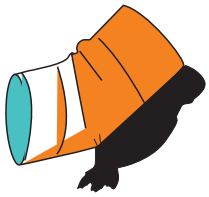
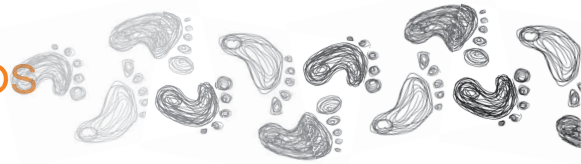


First steps





'Civilization, in the real sense of the term, consists not in the multiplication, but in the deliberate and voluntary restriction of wants'

Gandhi

Nowadays, democracy, our planet, the environment and consequently our civilisation are at stake every single time we make a purchase and in everything we do, but just like the frog that stays floating in warm water as the heat is gradually turned up and ends up being boiled alive, few of us are aware of it.

However, when we buy an item of clothing, are we sure that we are not encouraging child exploitation in the country where it was produced? When we consume a dairy product, are we aware of the milk's origin and about the fact that the multinational that sells it to us may have seized control of springs to make fizzy drinks to the detriment of local people? When we use the car or eat out-of-season food, do we realise that we are causing fuel prices to rise in almost all the world's countries? And when we use a bank's services, have we checked that it does not use tax havens? Are we sure that it does not invest in socially and environmentally irresponsible projects?

Obviously, we do not encourage this behaviour through our isolated actions, but by ensuring that these actions are increasingly repeated, we end up influencing society's choices. To understand the importance of each and every single one of us taking action, we should look at the effect on a famous shoe company of the campaign against its products, as it was getting its shoes made in inhumane conditions, and the referendum in Italy that has affirmed that water is public property, and the rash of ethical banks and investment opportunities in Europe. Civil society is a lot more powerful than it thinks and civil society is each and every single one of us. Everyone can do that 'little bit more' that will influence the thinking of those in power.

The 'little bit more' is often a 'little bit less' in reality. We must give up buying fruit and vegetables and switch to seasonal produce, we must stop drinking sugary fizzy drinks, we should stop wasting food (almost 40% is thrown out), we should not travel excessively and should seek to reduce our fossil fuel usage, we should remember to switch off the lights when leaving a room and

should not overheat our houses in winter. All of these recommendations appear in this handbook, so please read it and put it into practice.

So, what is really going on? We live in a world which the media tries to manipulate, presenting it as horrible, while we could be so happy if only we bought the latest gadget advertised with light, colours, music and tricks galore! Just when will TV viewers realise the extent to which these constantly forceful messages deaden our minds and prevent us from discovering a taste and the pleasure of living fully and modestly? Let this handbook help you. Taking that first step seems very difficult and even reckless, but you will see just how much better you feel after a short detox period. You will discover that you have more time to chat to others and more cash available for truly useful actions. So why not try it out and make it part of your way of life?

Environmental workgroup Emmaus Europe

Summary


WATER
7

Targeted watering

Introduction

Watering a garden seems like a simple enough activity. However, are you sure that you are watering as effectively as possible?

It is always possible to optimise watering techniques in order to save water and increase the quality of the plants being grown, and it is not expensive to do.

This factsheet contains information about different watering methods and about how to improve overall garden quality.[1]

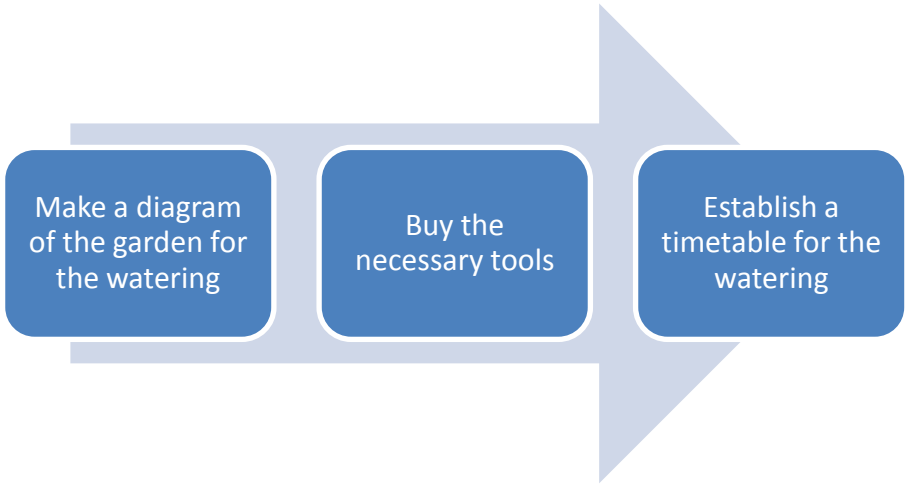
Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

[1] Please read Water Factsheet 7 (*Rainwater collection and reuse*) for more information.

2. Schedule



3. The main advantages

✓ Saves water and money, as the method is tailored to each specific requirement.

✓ Plants make better use of the water, leading to better quality plants.

4. The main disadvantages

× Drip irrigation emitters' holes are small, so the water being used must contain the lowest possible quantity of particles so that they do not become blocked.

× Surface sprayers and sprinklers are commonly used to water large areas, however leaves are left damp, which can encourage mould to develop. Furthermore, a high flow rate needs to be used.

× Spraying has its limitations with regard to detecting any obstructions or reductions in emitter flow rates.

Implementation

Phase one – Identify the needs of the garden and the group: are you gardening or farming?

It is important to make a distinction between these two forms of growing. The difference is mainly based on scale and resources: gardening may be a leisure activity, or

may be done with the aim of becoming self-sufficient, or to earn additional income, whereas farming is about profitability and usually involves large areas of land.

Having identified the type of land, you then need to measure water flow at the supply network inlet:

Multiply the volume of water by 3.6 and divide the amount obtained by the time in seconds taken to fill up this volume of water.

E.g.: A 10l bucket takes three minutes to fill up i.e. 180 seconds.

(10 x 3.6) / 180 = 0.20 **Flow = 0.20 m3/hour.**

Make a diagram of the plot's irrigation plan, using a compass to indicate the range of each emitter. The jets of water need to overlap in order to water uniformly.

Calculate the number of watering systems needed based on the flow from each emitter.

Leave the hoses uncoiled in the sun for an hour before beginning. This will make them easier to install.

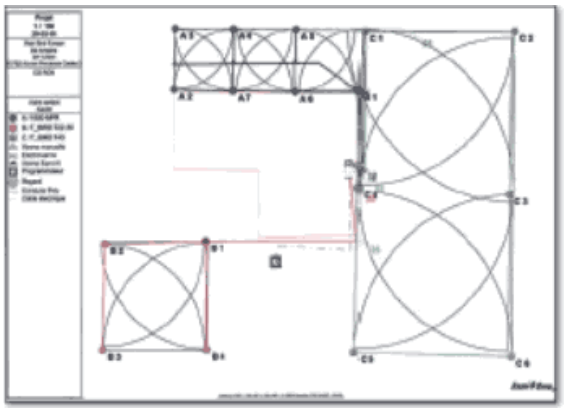


Diagram 1 Sample watering plan depicting the range of the sprayers

Phase two – Available techniques:

Domestic watering

There are several simple and easy to install options if you are looking to water a small flower garden or grow a few sorts of lettuce and vegetables. You can use rainwater that has been collected (please see Water Factsheet 7 for information about collecting rainwater).

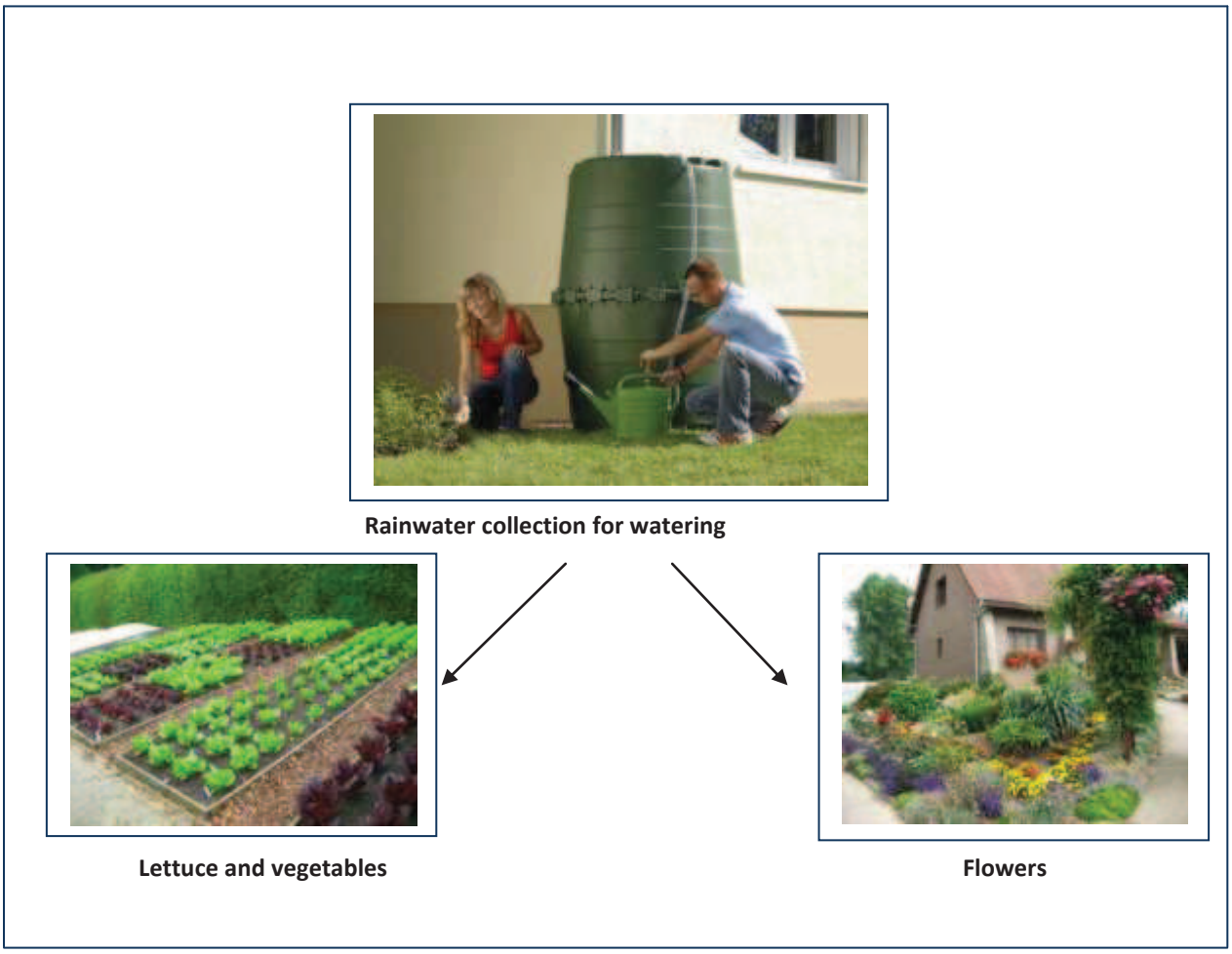


Diagram 2. Domestic watering

Phase 3 – Set watering times

The watering system can be automatic or manual.

Installing an automatic watering system controlled by a control unit means that your garden is watered regularly and that you do not have to handle hoses. The automatic system

distributes the right amount of water for each type of plant and saves time and water. However, this does not rule out manual watering, which simply needs to be done carefully.

5. Member organisations that use this technique

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine. The search engine enables you to identify European groups with everyday water-saving practices and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Possible partnerships

Sometimes universities offering agriculture-related disciplines make their students, bibliographies and professionals available to small farmers or those seeking help. They provide guidance and conduct project feasibility and case studies free of charge.

7. Useful websites

- ✓ Watering devices and systems (English)
- ✓ How to design an automatic watering system (French)
- ✓ Drip irrigation devices (English)
- ✓ Types of sprayers for outdoor watering (French)
- ✓ How to set up a watering system (Spanish)
- ✓ Garden watering plan resource sheet (Spanish)
- ✓ How to construct an automatic watering system (Spanish)

Other tips

- Water the garden in the morning or late afternoon to prevent the water from evaporating.
- Make compost to use in the garden (see Factsheet 21 – Waste).

- Check that the system has no leaks and that the motors are working properly before filling in the trenches.
- Remember to drain the network of underground pipes before winter starts.
- Do not leave the control unit outside during the winter: dismantle it and remove the batteries.

Everyday ways to reduce water consumption

Introduction

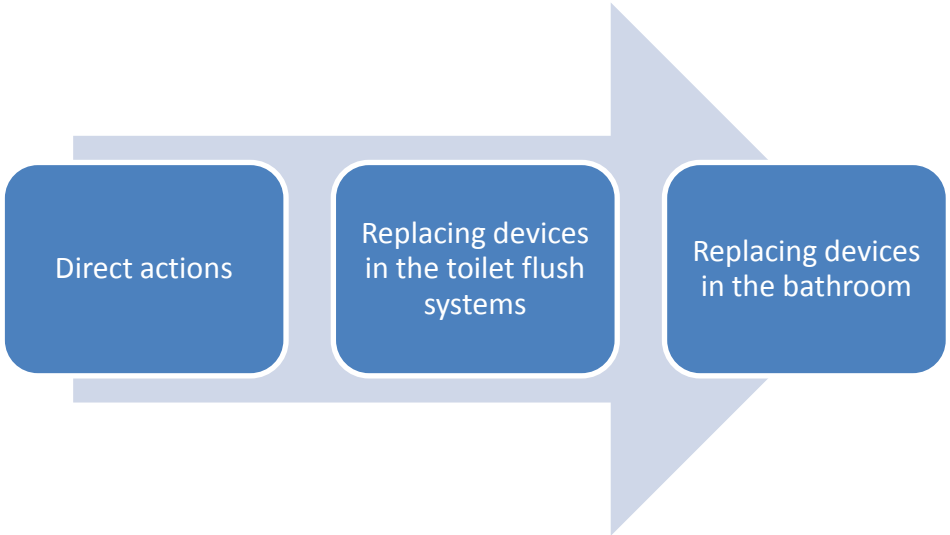
This factsheet contains information about things you can do and devices you can use to save water in an effective and hassle-free way. Working locally also means working globally! In addition, reducing your water consumption will cut your water bill.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺

2. Schedule



2.1 Direct action – for immediate implementation

- Shower: Turning off the shower when lathering up enables you to save X litres of water.
- Only use your washing machine and dishwasher for full loads.
- Turn off the tap when washing your hands, brushing your teeth and shaving.

2.2 Planned action – indirect implementation

- Flow reducers and regulators: Taps can be fitted with these sorts of devices which reduce water use by approximately 60%. These flow reducers mean that less hot water is needed for washing your hands or doing the washing-up, for example. In turn, overall energy consumption drops (electricity, gas and heating oil) because less water needs to be heated. A list of the different types of flow reducers:

Type of flow reducer	Features	Average price
Regulated flow	Flow of **4.5 – 6.5l per minute.** These devices do not mix air with water, meaning that water is clear and not aerated, helping to limit germs.	These products can be found in specialised stores (some are made with environmentally friendly materials) with prices starting at €5.
Aerated flow	With flow of **4.5-6l**, an aerator mixes air and water, making washing your hands and cooking a pleasant experience due to the frothy nature of the water.	
Straight flow	With a stream of **4.5 – 6.5l** a minute, this sort of device is quite powerful and easy to direct and works well in shared accommodation.	

- Repair taps and toilet flush systems. A dripping tap wastes 100l a day and a leaky flushing system wastes 1,000l per day. Leaks can account for 20% of consumption.
- Water-saving toilet flush mechanism: costs only €15 and is easy to install, this mechanism offers two different flushing options for different needs.

3. The main advantages

✓ Apart from helping to conserve water, which is essential for life, a reduced water bill is also a major plus point.

✓ Accessories are affordable and are not difficult to source and install.

✓ Accessories made from environmentally friendly materials are also available.

4. The main disadvantages

× It is not always easy to convince people about the importance of these measures. You must keep going every day so that people grasp the appealing aspect of saving water.

Implementation

Phase 1 – Direct implementation / searching for solutions - prices

The simple ways of saving water listed above do not require any equipment; instead you just need to start implementing them. However, if you need to install new devices or change existing fittings, you can begin by choosing the type of product and requesting quotations.

Phase 2 – Change the taps

It is a good idea to start by changing taps, because they are not expensive and changing them is the simplest of all the options on offer.

Phase 3 – Shower and toilets

Installing flow reducers in the shower and toilet flush systems requires a little more time and knowledge, but can easily be done by the average DIYer in a day. Toilets and showers consume the greatest amount of water, so these are the most important measures.

These devices (flush systems, taps and washers) need regular maintenance to prevent leaks and an increased bill.

5. European member organisations that use these techniques

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine. The search engine enables you to identify European groups with everyday water-saving practices and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

These types of initiatives are very commonplace in schools, businesses and the public sector.

As drinking water availability is a worldwide cause for concern, a range of associations and organisations provide support for those wishing to save water. You will find a list of useful websites further down the page.

7. Possible partnerships

Regional water companies: normally water treatment and supply companies offer users water use reduction measures. Local government is also a potential partner.

8. Useful websites

- ✓ French government website about sustainable development (French)
- ✓ 25 ways to conserve water (English)
- ✓ "Water – Use It Wisely" campaign website - 100 ways to save water (English)
- ✓ Small steps, big solutions guide (Spanish)
- ✓ Guide to reducing water consumption (French)

Water-saving dishwashers / washing machines

Introduction

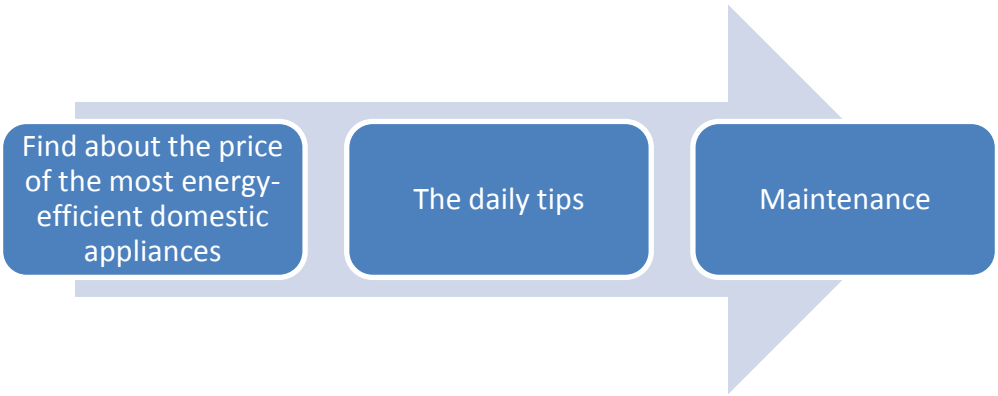
Washing the dishes and washing clothes are everyday activities for the Emmaus groups, particularly in the communities. Dishwashers and washing machines account for roughly 25% of household electricity use and 21% of water use, meaning that it is important to choose the greenest possible appliances. However, if we are to prevent waste, we must also change our habits[1].

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule



[1] Please read Water Factsheet 2 Everyday Day Ways to Reduce Water Consumption and Factsheet 5 Eco-friendly Cleaning Products for more information.

3. The main advantages

▪ Energy and water savings, with the resources used being optimised, therefore making for financial savings.

4. The main disadvantages

× The most efficient appliances may be slightly more expensive at the outset; however this price difference is paid off over the years, as these appliances help to cut bills.

Implementation

Phase 1 – Criteria and recommendations for making the right choice

From 1992 and following directive 92/75/EC[2], most domestic appliances should have an energy rating label. The label is aimed at consumers and summarises a product's features, and particularly its energy efficiency, in order to help consumers decide which model to buy.

The EU has adopted a new look label:

Illustration 1: The new energy label

[2] For more informations Click here

New energy efficiency categories have been introduced on the new label, with the grades now ranging from A+++ for the most efficient appliances to D for the least efficient appliances.

The energy label also provides information about appliance capacity, annual energy consumption, annual water consumption, drying or spin drying performance, and noise pollution. Finally, it may also include the European ecolabel if the appliance has been awarded it.

When choosing a washing machine / dishwasher, it is recommended that you ensure that the appliance's capacity is in line with your needs: how many people live in the house and how often will the appliance be used?

- Average washing machine load size is 4kg. It is pointless buying a 7-8kg capacity machine if it is not needed.
- Dishwashers: These appliances tend to range from four to fourteen place settings and there are two main categories:
    - 12+ place settings: these dishwashers are usually 60cm wide and suit families of three / four or more people.
    - Eight to nine place settings: 45cm wide, these washers are suited to smaller households.

Phase 2 – Everyday usage

- Wait until you have a full load before putting on the appliance. If this proves impossible, press the half load button: this function reduces water and electricity consumption by 20%.
- Temperature also needs to be taken into account: the 30° and 40° cycles consume close to three times less energy than a 90° washing machine cycle. 80% of the energy consumed by a dishwasher is for heating the water, so opt for the Economy cycles or the 50°C programmes when looking to save water.

- To make further savings, run the appliance at night, making use of your power supplier's off peak rates. If you want to take this route, choose a quiet model that comes with a delay setting.
- Connect the appliance directly to the hot water if possible. Heating the water with a more efficient source of energy than electricity (solar panels or natural gas, for example) could save you up to 40%.
- Choose and measure out the detergent: the chemicals contained in washing powders end up in the water and harm the environment. Opt for environmentally friendly washing powders[3] or detergents that bear an eco-label wherever possible in order to limit their negative impact on the natural world. Using too much powder does not make for a better wash and actually harms the environment.

Phase 3 - Maintenance

- Opt for appliances that can be taken apart in order to be able to deal with any faults once the guarantee has run out.
- Periodically clean the door seal and the dishwasher's filter to increase the appliance's service life.

5. European member organisations that use these techniques

Emmaus Europe website's Environment section contains the Sharing environmental practices and activities search engine. The search engine enables you to identify European groups with everyday water-saving practices and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. European Waste Electrical and Electronic Equipment Directive

Directive 2002/96/EC[4] of 27 January 2003 on waste electrical and electronic equipment (WEEE directive) makes it obligatory for distributors, when selling a household

[3] See Water Factsheet 5 *Eco-friendly Cleaning Products.*
[4] Link to the ADEME website

electrical and electronic appliance, to take back free of charge or get taken back free of charge the waste electrical and electronic equipment that the consumer no longer wants (on a 'one to one' basis). If you want to dispose of an old appliance without buying a new one, you should take the old appliance to a waste reception centre or call the relevant council department. It should be noted that this directive is aimed at households and is therefore not applicable to groups with industrial type appliances.

The rollout of this vital new treatment industry comes at a cost, which will be borne by consumers. From February 2011 or 2013 for some appliances, the cost of this eco-contribution will be indicated on the sales invoice and will be €6 for dishwashers.

7. Useful websites

- ✓ ADEME[5] green living page (French)
- ✓ Top Ten purchasing guide[6] (French)
- ✓ WiseGeek: Clean answers for common questions (English)
- ✓ Agenda 21: How to choose a washing machine and dishwasher (French)
- ✓ One green generation (English)
- ✓ Saving energy at home (Spanish)
- ✓ Practical ways to save water (Spanish)
- ✓ WEEE regulatory framework (French)

[5] ADEME: French Environment and Energy Management Agency.

[6] Topten guide is a WWF-France and CLCV consumer association initiative. This product comparison site is based on the Swiss www.topten.ch website and is supported by ADEME. It is part of the European Topten www.topten.info initiative, which is supported by the European Commission. 16 European countries are developing these websites and they aim to be consumer oriented in the different countries.

Calculating water use

Introduction

Freshwater is vital for life but only a limited supply is available on the earth and water quality is constantly being threatened. It is important to know how much water we use in order to avoid wasting water and evaluate our drinking water, food production and leisure water use.

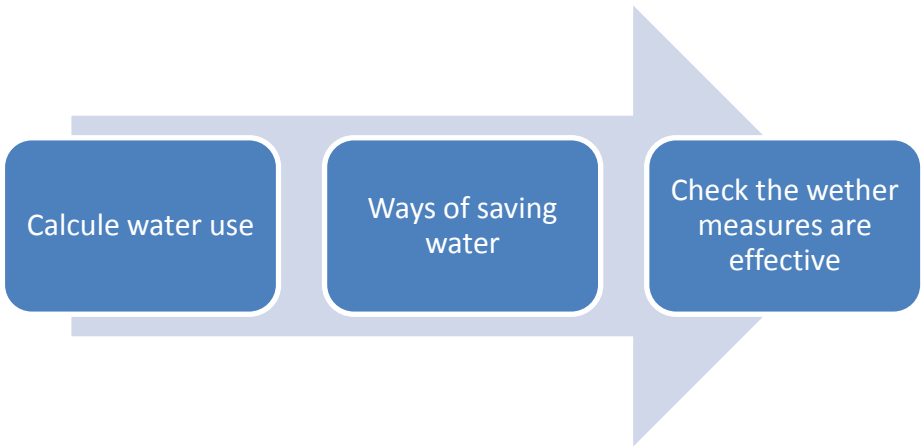
This factsheet contains practical information and tools that you can use to calculate your group's water use.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule



All you need to do to calculate the amount of water you use is look at your annual water bills and read the water meter every month. A monthly average is a more reliable figure as it takes account of all the seasons of the year.

Sample comparison:

First bill

Period: from __/__/__to __/__/__
Number of days:
Usage: _____ (m^3)
Usage in litres (usage in m^3 x 1000)= _____ litres
Number of people: _____

$$\frac{\text{(Number of litres)}}{\text{(number of days) x (number of people)}} = \text{\_\_\_\_\_ litres per person per day (l/p/d)}$$

Second bill

Period: from __/__/__to __/__/__
Number of days:
Usage: _____ (m^3)
Usage in litres (usage in m^3 x 1000)= _____ litres
Number of people:_____

$$\frac{\text{(Number of litres)}}{\text{(number of days) x (number of people)}} = \text{\_\_\_\_\_ litres per person per day (l/p/d)}$$

Source: WWF Belgium

You can start at once, as you can look at water usage from the past few years and at whether it has changed, in order to take the necessary measures.

3. The main advantages

✓ Calculating water use enables you to find out when peak usage occurs and to make savings in the future.

✓ By saving you are helping to conserve this essential resource: 884 million people do not have proper access to treated water and 2.6 billion people do not have access to basic sanitation (source: Action against Hunger, 2012).

4. The main disadvantages

× Calculating water use is easy to do and does not cost anything, so there are no drawbacks.

Implementation

Phase 1 – Calculate water use

The first step in the process is to analyse your water bills. You will immediately be able to identify the heavy usage months.

Phase 2 – Ways of saving water0}

Refer to Chapter 1 – Water Factsheet 2/4 Everyday Ways to Reduce Water Consumption where you will find more information and practical tips to help you save water. You need to carefully follow the suggested tips for a minimum period of time of your own choosing in order to check whether these measures are effective. It should be noted that the minimum periods should be equivalent periods, i.e.: compare winter 2010-2011 with winter 2011-2012, for example.

Phase 3 – Check whether the measures are effective

Once the trial period comes to an end, you can check whether the measures were effective by comparing water bills from the corresponding months.

5. European member organisations that use these techniques

At the present time, there are four Emmaus groups in Europe (information is available on the website: click here) who have stated that they monitor their water use: Emmaus Westervik in Finland, Emmaus Ferrara in Italy, Emmaus Navarra in Spain and La Poudrière in Belgium.

It is worth contacting them in order to discuss the issue and take note of any potentially useful tips.

Water use in Europe varies greatly but the WHO (World Health Organisation) recommends that each person should use 200l a day. This figure enables us to compare water use in the group.

6. Other forms of water usage

Several websites provide calculators that can be used to work out water consumption using the relatively new concept of a water footprint[1], which takes account of all the water used from when a product / service is manufactured up to and including its consumption. It is a more accurate way of calculating water use. For example, we can work out how much water is needed to make a pair of jeans or produce 1kg of sugar.

Some websites can help us to do this and provide information about the amount of water used to make various products or deliver services, with the official water footprint website being an example.

[1] An individual, community or business's water footprint is the total amount of freshwater needed to produce the goods and services consumed by the individual or community or produced by the business.

7. Civil society organisations involved in this area

People discuss their own experiences and ask questions on certain websites. It is always possible to pass on knowledge and share experience with others. For example, if you go to the following link, you can calculate your personal water use based on everyday activities:

Water usage calculator (English).

8. Useful websites

- ✓ Water footprint calculator (English)
- ✓ Water footprint: so what is a water footprint? (French / English)
- ✓ Water usage calculator (French)
- ✓ Individual water usage calculator (Spanish)
- ✓ Biosphere project (Spanish)

Calculating indirect water use: your water footprint

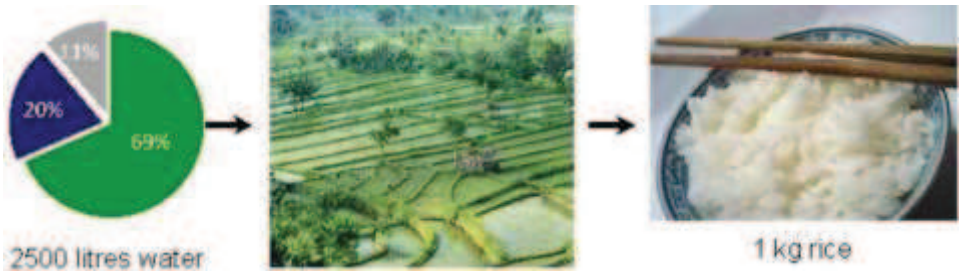
Introduction

This factsheet focuses on calculating water use as featured in water factsheet 4 *Calculating Water Use.* The factsheet presents a new take on the issue and a recent method for estimating water use.

"People use lots of water for drinking, cooking and washing, but even more for producing things such as food, paper, cotton clothes, etc. The water footprint is an indicator of water use that looks at both direct and indirect water use of a consumer or producer. The water footprint of an individual, community or business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the individual or community or produced by the business." [1]

This concept is the basis for the water use calculators offered by several websites. The method enables all the water used from when a product or service is produced up to and including its final consumption to be calculated, as well as each individual's direct consumption. It is a more accurate way of calculating total water use. Here are a few water footprint examples:

[1] Source: http://www.empreinte-de-l-eau.org/?page=files/home



1 Kg of cotton denim – one adult pair of jeans weighs 0.8-1kg.

A water footprint can also be measured in terms of calories and quantities of protein and fat, as listed in the following table.

Table 1 The water footprint of selected food products

Product	Water footprint: litres/Kg	Water footprint: litres/Kcal	Water footprint: litres / gram of protein	Water footprint: litres / gram of fat
Sugar crops	197	0,69	0	0
Vegetables	322	1,34	26	154
Fruit	962	2,09	180	348
Cereals	1644	0,51	21	112
Milk	1020	1,82	31	33
Eggs	3265	2,29	29	33
Chicken	4325	3	34	43
Beef	15415	10,19	112	153

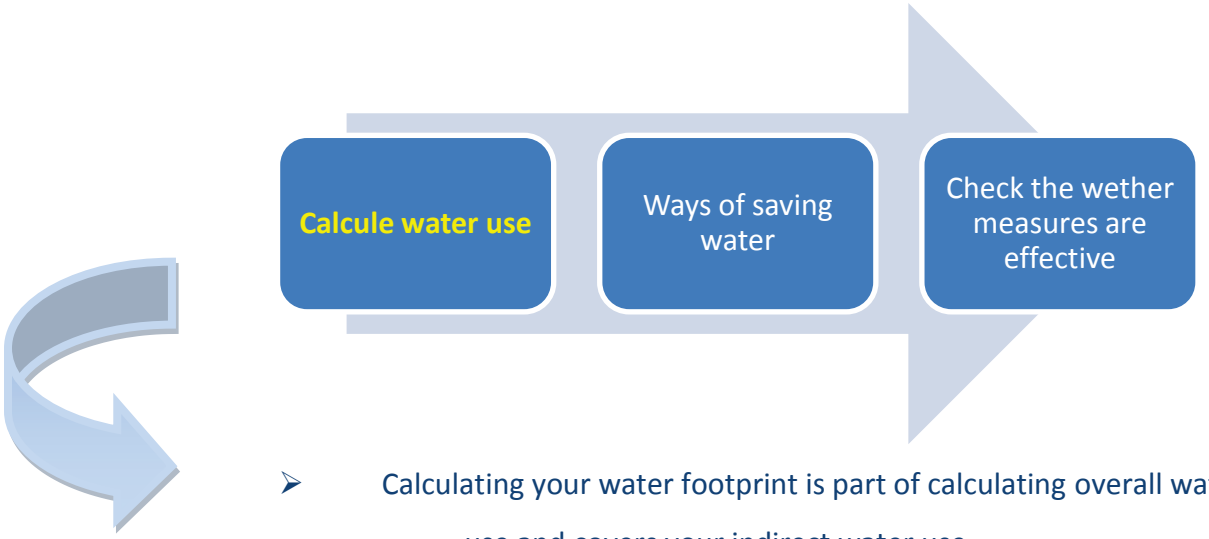
Source: Mekonnen and Hoekstra (2010)

Practical information

1. Factors

Factor	Rating
Overall complexity	☺
Time taken to implement	☺☺
Budget	☺☺☺

2. Schedule



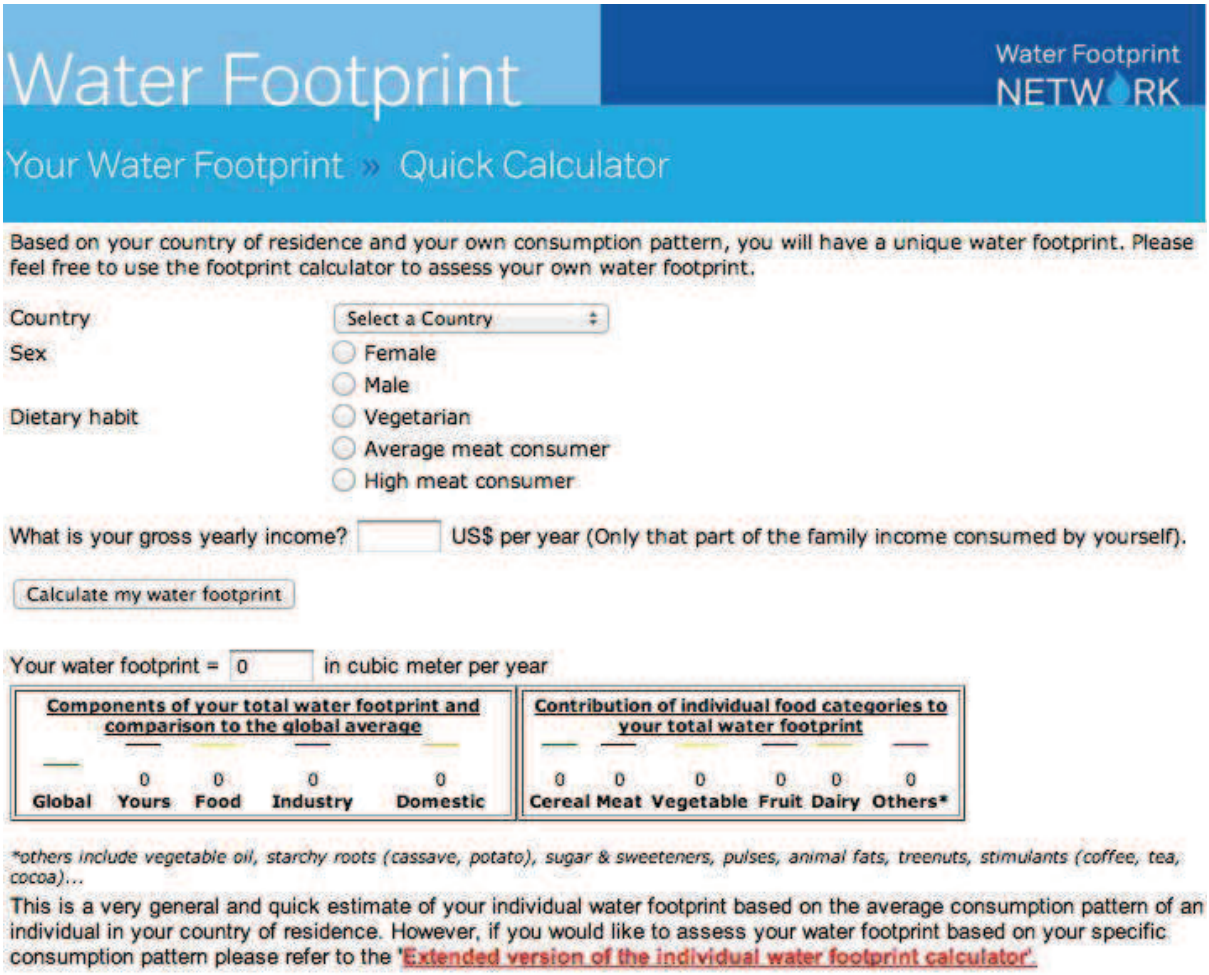
- Calculating your water footprint is part of calculating overall water use and covers your indirect water use.

Implementation

Some websites can help us to do this and provide information about the amount of water used to make various products and services, with the official water footprint website being the main such website. The following two links are to a simplified calculator and a more extended version of the water footprint calculator. Although they are in English, both calculators are very easy to use and you just need to have estimates of your consumption to hand.

Simplified method :

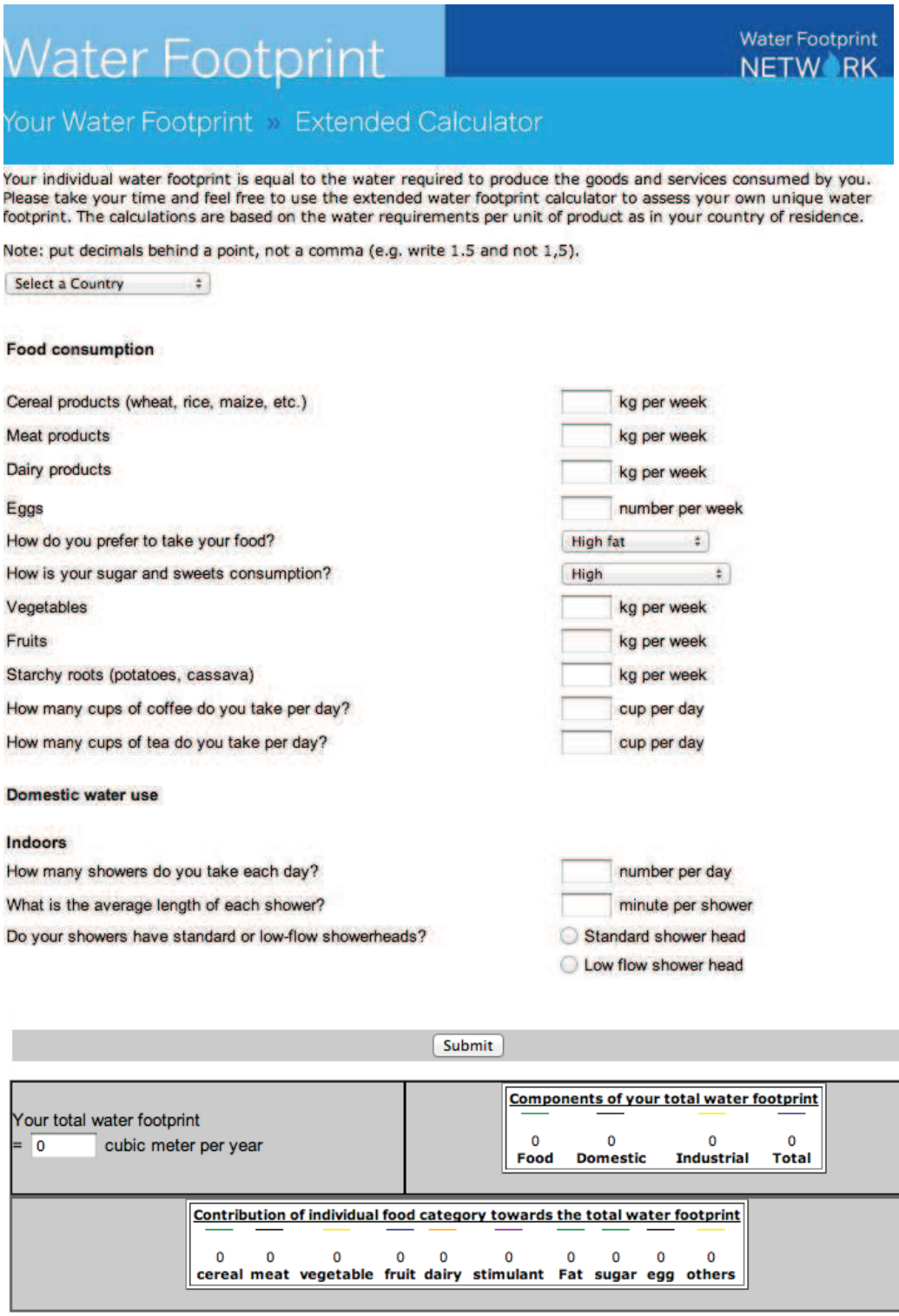
http://www.waterfootprint.org/index.php?page=cal/waterfootprintcalculator_indv



This calculator is a general and simple way of estimating your individual water footprint. It is based on the average consumption pattern of an individual in your country of residence. However, if you wish to assess your water consumption using a more comprehensive method that takes account of the main components of everyday water usage, the following method also exists:

Extended version :

http://www.waterfootprint.org/index.php?page=cal/WaterFootprintCalculator



Water Footprint

Water Footprint NETWORK

Your Water Footprint » Extended Calculator

Your individual water footprint is equal to the water required to produce the goods and services consumed by you. Please take your time and feel free to use the extended water footprint calculator to assess your own unique water footprint. The calculations are based on the water requirements per unit of product as in your country of residence.

Note: put decimals behind a point, not a comma (e.g. write 1.5 and not 1,5).

Select a Country

Food consumption

Cereal products (wheat, rice, maize, etc.)	kg per week
Meat products	kg per week
Dairy products	kg per week
Eggs	number per week
How do you prefer to take your food?	High fat
How is your sugar and sweets consumption?	High
Vegetables	kg per week
Fruits	kg per week
Starchy roots (potatoes, cassava)	kg per week
How many cups of coffee do you take per day?	cup per day
How many cups of tea do you take per day?	cup per day

Domestic water use

Indoors

How many showers do you take each day?	number per day
What is the average length of each shower?	minute per shower
Do your showers have standard or low-flow showerheads?	Standard shower head
	Low flow shower head

Submit

Your total water footprint
= 0 cubic meter per year

Components of your total water footprint

Food	Domestic	Industrial	Total
0	0	0	0

Contribution of individual food category towards the total water footprint

cereal	meat	vegetable	fruit	dairy	stimulant	Fat	sugar	egg	others
0	0	0	0	0	0	0	0	0	0

Estimating indirect water use enables you to have a critical overview of daily consumption. The aim is also to get everyone to reflect on the issue when they are doing their shopping.

Useful websites

- French version of the official water footprint website

  http://www.empreinte-de-l-eau.org/?page=files/home

- Spanish version of the official water footprint website

  http://www.huellahidrica.org/?page=files/home

Organic cleaning products

Introduction

It is important to know what an organic cleaning product actually is. At least 95% of the ingredients contained in an organic product must come from organic farming, i.e. they must be GMO[1], chemical fertiliser and pesticide-free. There are various types of organic cleaning products. They are developed in compliance with a number of standards. These standards may cover product formulation, packaging or energy efficiency in order to have the lowest possible impact on the environment. However, this does not necessarily mean that the product is environmentally friendly throughout its life cycle.

If you want to be sure that a product is truly organic, you should check its packaging for a label, which in the EU is called an Ecolabel[2]. Each country has a body that is responsible for this certification and they are listed on the EU website (which can be found in the product / country list below – see page 4).

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺

[1] GMO: (Genetically modified organism) An organism whose genome has been altered by genetic engineering. The organism's reproductive cells contain the modification which can then be passed on to its offspring. Definition provided by: INRA – French National Institute for Agricultural Research, see http://www.inra.fr/genomique/ogmbd/definitionsogm.htm

[2] The **European Ecolabel** was created by the European Commission in 1992 and is awarded throughout Europe based on the same criteria. It guarantees a reduced environmental impact over the whole of a product's lifecycle. Each reference framework can be accessed by the public and is revised approximately every three years.

2. Schedule

You can start to gradually use organic products in order to avoid the switchover having a major impact on your monthly budget.

As the aim of replacing standard cleaning products is to protect people's health and the environment, the most logical first step is therefore to start by replacing the most toxic products:

2.1 Ammoniac: Ammoniac is present in kitchen and bathroom cleaning products. It evaporates quickly, irritating the skin.

2.2 Benzene, xylene and toluene: Some glues, varnishes and paints contain these substances and their vapours can cause headaches, skin and eye irritation and can cause cancer in large doses.

2.3 Chlorine: Household bleach-based products contain chlorine which at room temperature is an irritant gas and can cause a number of respiratory problems.

2.4 Soda: Apart from the soda present in soaps and detergents in general, it has an irritant and corrosive effect on the skin, eyes, respiratory and digestive system.

3. The main advantages

Using organic cleaning products is a healthy and safe way of keeping the environment clean.

✓ Our health is protected, as while it is impossible to remove all the toxins in the environment, at least they are reduced. Reduces the illnesses that can be caused by these toxins and also enables the body to recover more quickly if it has already been affected by exposure to these substances.

✓ Fewer foreign chemical substances are introduced into the environment, thus reducing the need for water, of which there is a shortage, to be treated, and also avoiding soil contamination, which could affect local farming.

4. The main disadvantages

× At the present time, the cost of organic cleaning products is slightly higher than conventional products, but the difference in price is dropping all the time.

× It can be quite difficult to source this type of product, as they must meet a number of manufacturing criteria. Not all companies are capable of complying with the EU label's standards.

Implementation

Phase 1 – Searching for solutions / prices

Finding shops that specialise in organic products either independently or via local associations will enable you to compare the price of standard products with the price of organic products. You could also contact the groups that already use organic products to get some tips and guidelines.

Phase 2 – Replace the most harmful products

Once you have found the best price, begin by replacing the most toxic products (the most common and more toxic substances are listed in section two – see page two).

Phase 3 - Getting into the habit of buying organic

Following the first round of replacements, buying organic will become more and more of a habit and you will simply have to wait for prices to come down for this habit to become second nature in the group's day-to-day life.

5. European member organisations that use these techniques

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine. The search engine enables you to identify European groups that use organic cleaning products and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

More information about sales outlets in a given region and other organisations / associations that use these products can be obtained from local associations.

7. Civil society organisations involved in this area

- The state: As this sort of product is still slightly more expensive than standard cleaning products, the State may take action in the form of tax breaks for product manufacturers to ensure fairer competition.

8. Possible partnerships

- Local producers and associations.

9. Useful websites

- Organic and eco directory: Where to find all kinds of organic products throughout France (French).
- European Union - Labels: Entities that certify organic products in each of the European countries (English).
- La llavoreta: Spanish association of consumers of organic products (Spanish)
- Association pour l'information et la promotion des produits biologiques: This association provides information about organic products and promotes them. It holds meetings on the topic and makes group orders of organic products (French).
- Soil Association - UK: the Soil Association is a charitable organisation and is the main organic certification body (over 80% of organic products in the UK are certified by them) (English).

Building and maintaining a well

Introduction

Wells are structures based on geological studies and are dug in order to access groundwater. Well type depends on various factors: the type of technology chosen, environmental protection and safety methods and the operating system.

The main two well types are standard wells, in which water remains within the well and must be pumped to the surface, and artesian wells, in which the water rises by itself under positive pressure.

Water from wells can be used for several activities and therefore helps to save water and enables self-sufficiency.

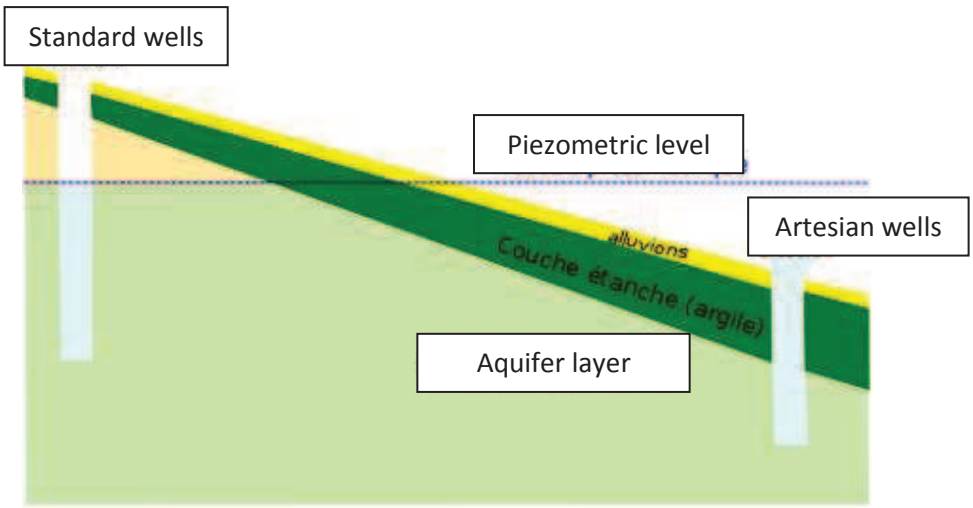


Illustration 1 Difference between a classic and an Artesian well[1]

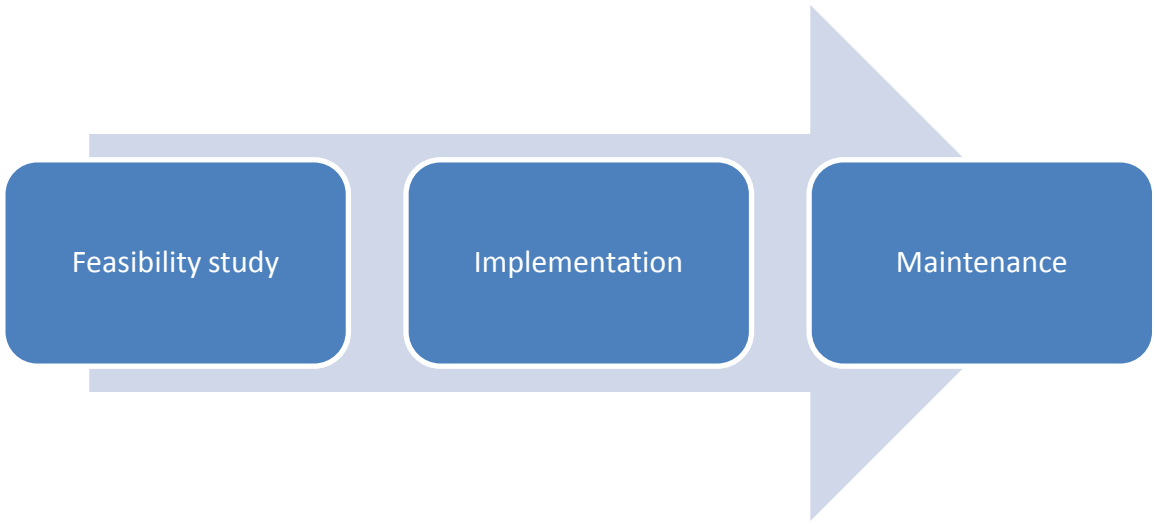
[1] The level, slope or piezometric surface is the height or depth (in relation to the surface) of the limit between the saturated and non-saturated zone in an aquifer formation.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺
Time taken to implement	☺
Budget	☺

2. Schedule



3. Advantages

- ✓ Cuts mains water supply costs.
- ✓ Enhances the plot of land.
- ✓ Puts an end to drought and water rationing problems.
- ✓ Quality water.

4. Disadvantages

× Complex nature of the project: a feasibility study is required, implementation, all the phases must be supervised by professionals with expertise in this area.

Implementation

Phase 1 – Feasibility study

Local legislation on well construction must firstly be checked. Each region has its own regulations that must be respected. For example, very deep wells normally require permission from the local authorities, as does domestic usage of well water.

Feasibility studies cover:

- Ground type: this will determine whether it is possible to build a well.
- Hydrogeological study: this study identifies the likelihood of there being water resources in the location being checked. If it is likely that water resources are available, a trial drilling project is put together.

The regional authorities can be contacted to find out about the location of groundwater bodies in the region or you can check the geological maps available at local geological offices.

Drilling companies may also conduct studies in order to find water while some people prefer to call on water diviners who often work in partnership with drillers and well-diggers.

Phase 2 – Implementation

If the result of the initial studies is positive, the project can be rolled out.

Pay attention to the contract signed with the company that will be doing the work: the contract should cover any contingencies and the additional cost of implementing them and a contractual guarantee to provide assistance.

The entire project must be overseen by a responsible technical expert. From a technical perspective, bad decisions with regard to filter position or the choice of cladding in areas in which there is a risk of water contamination can compromise the quality of the service.

Phase 3 - Maintenance

Well maintenance depends on the type of water found. For example, the water may be dirty, which can block the filters (they will be incrusted with minerals) and therefore reduce the output. Water could also be corrosive and in that case the well will need more regular maintenance. The well must be cleaned and disinfected with bleach or other bactericides once a year. This is necessary as most of the time the water level is exposed to the development of colonies of moss and bacteria. However, cleaning a well is as simple as cleaning a shared water tank.

5. European member organisations that have wells

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups, such as Emmaus Ferrara in Italy, that use this system and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

In India, wells are being constructed with a twin-pronged objective. Firstly, the aim is to access groundwater and secondly, wells are built to return rainwater to the substratum, as the country was experiencing a serious shortage of drinking water. Consequently, in a 6,500km² area, small mines and dry springs are flowing again.

7. Possible partnerships

The feasibility study can be conducted by researchers and geologists from major universities.

8. Useful websites

- ✓ Technical standards for well construction (Spanish)
- ✓ French decree 2008-652 of 2 July 2008 relating to the usage of domestic water, France (French)
- ✓ UNICEF – well construction methods (French)
- ✓ Video: How a water well is drilled (English)
- ✓ Well construction manual (English and Spanish)

Rainwater collection and reuse

Introduction

Rainwater has been part of humankind's life from the beginning of time and there are examples of it being collected and used for various purposes throughout history.

At the present time, there is growing awareness about resource sustainability and this is resulting in new ways of planning buildings and towns in order to capture rainwater for activities that do not require drinking water (rainwater is costly and difficult to treat for human consumption purposes).

The following pie chart shows how water is used in a household:

35% baths and showers

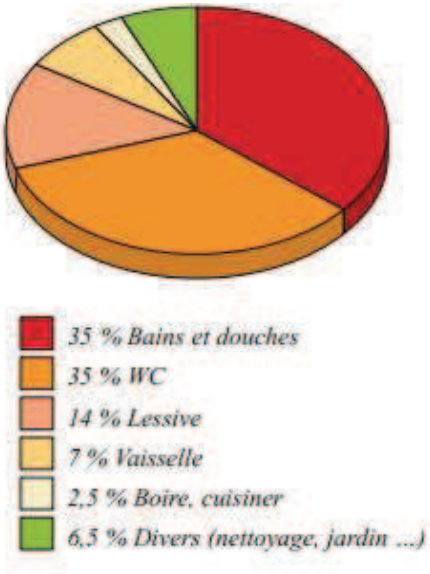
35% toilets

14% clothes washing

7% washing-up

2.5% drinking and cooking

6.5% other (cleaning and



Source: WWF Belgium

A large volume of water is used for activities that do not actually require drinking water and toilets send one-third of a household's drinking water back into the sewage system.

Furthermore, harvesting rainwater has the benefit of limiting the impact of rainwater runoff in urban areas in the face of growing ground impermeability and the resulting flooding that may occur depending on the region in question.

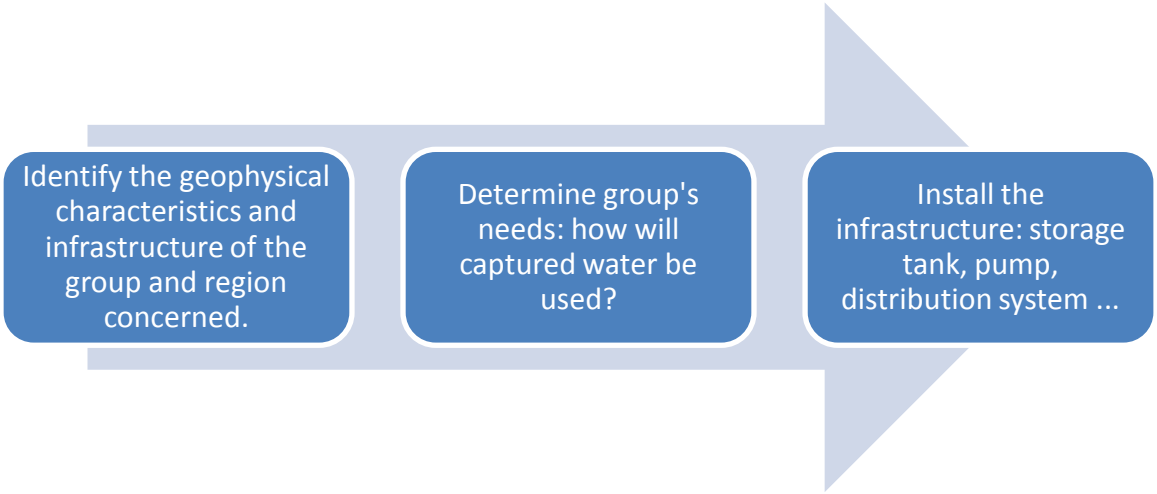
Practical information

1. Factors

Factor	Rating
Overall complexity	☺
Time taken to implement	☺
Budget	☺☺

2. Schedule

The schedule depends on the system being set up:



With regard to the time taken to implement and the cost of a rainwater collection and reuse system, the *Technical criteria for a sustainable and energy saving system* guide published on the Bruxelles Environnement website in 2010 states that "*it remains expensive and the payback period is inevitably long. The cost varies greatly depending on the system you choose to install, from around €1,500 to €8,000 for a complete system, with the payback period being evaluated at 6-14 years. Generally speaking, for full systems, the more appliances that are connected, better the return on investment. A system solely used for garden watering can however work out a lot cheaper.*"

3. The main advantages

✓ Rainwater harvesting savings depend on the size of the roof area and the tank, the number of people concerned and what the water is used for. However, the system is guaranteed to pay for itself.

✓ Capturing rainwater reduces the risk of flooding caused by impermeable ground in urban areas.

✓ The water collected is soft which helps to prolong the service lives of domestic appliances and systems (washing machine, pipes and toilets).

4. The main disadvantages

× Finding a place for the tank is not always easy; as total rainfall varies from year to year (this phenomenon is counteracted by storage).

× Water has to be treated: rainwater is not suitable for drinking purposes because it has been in contact with the air (pollution) and the roof (decomposing plants, animal excrement, metals, asbestos etc).

Implementation

Phase 1 – Identify the building's characteristics

Not all types of roofs are suitable for rainwater harvesting, so you need to check:

1. Coating: roughness, porosity, evaporation rate and the presence of hazardous substances, such as asbestos cement slates and zinc.
2. Roof area, as the bigger the roof, the bigger the collection tank.
3. Aspect and angle of a sloping roof.

Table 1. Rainwater collection rate Source: Wilo[1]

Roof type	Collection rate
Flat gravel covered roof	60%
Flat roof with a synthetic or roofing felt covering	70 – 80
Flat green roof (grass or other plants)	20%
Sloping roof covered by roof tiles or panels	75 – 95%
Sloping roof with a synthetic or roofing felt covering	80 – 95%
Sloping green roof (grass or other plants)	25%

Phase 2 – Searching for solutions

The next step is to identify the needs and objectives of the group in order to find out which form of treatment is the best fit for the project.

Table 2. Type of treatment recommended for each type of water usage

Types of water usage	Suitable for this type of usage	Treatment required
Drinking / cooking	NO	Drinking water treatment
Washing	Should be avoided	Secondary filtration
Toilets / washing machine / household cleaning	YES	Primary filtration
Outdoor usage / gardening	YES	Prefiltration

[1] Wilo is a German manufacturer of pumps and pumping systems for central heating, cooling and air conditioning systems and for water supply and wastewater removal. It has a subsidiary in France in Bois d'Arcy.

Phase 3 – Infrastructure and treatment needed

Infrastructure and treatment depend on the type of usage selected. There are several potential options:

1. **Storage tank:** Several types of tanks can be used. The factors to be taken into account are tank material - concrete or polyethylene plastic (the most common) and the siting of the tank – underground or on the surface.

Table 3. What material to choose

Material	Advantages	Disadvantages	Usage	Cost
Concrete	- Neutralises the natural acidity of rainwater. - Can be used all year round: not affected by frost when installed underground. - Lifespan of several decades. - Enables large volumes of water to be stored, which can then be used indoors and outdoors.	- Needs more regular cleaning because of its porosity. - Can leak.	Outdoor and indoor.	Installation costs are higher than for a plastic tank and the tank needs to be installed by a professional. Estimated cost: €2,000 for a 5,000l tank.
Polythene plastic	Easy to install at ground level.	-Need to place limestones inside the tank as plastic does not neutralise the water's acidity. - The tank needs to be emptied in winter as it is affected by frost. - Algae are more likely to develop in a plastic tank.	Outdoor	The cost of installing a plastic tank is lower than the cost of a concrete tank, mainly because the material itself is cheaper. Estimated cost: €150-€200 for a 200l tank. However, the cost may rise to around €6,000 if the tank is installed underground.

2. Rainwater treatment and filtration

Usage	Treatment	Description	Cost
Drinking / cooking	Drinking water treatment	- A **UV steriliser**[2] or a **special ceramic cartridge** to eliminate bacteriological pollution, however water quality needs to be checked by a competent body. - **A dialyzer**[2] is a very effective alternative means of eliminating bacteria; however it is more expensive and also discharges five litres of water for every litre it actually filters.	The cost of a rainwater harvesting system varies greatly depending on the type of system and filtration selected.
Washing	Secondary filtration	**- Active carbon filter**[2] installed in the system before the water heater enables rainwater to be used as hot water for washing; by this point water is inoffensive but not yet suitable for drinking.	
Toilets / washing machine / household cleaning	Primary filtration	- **+/- 10 µm filter** enables rainwater to be used for cleaning, in the washing machine and in toilets (cold water system). These filters can be self-cleaning and not need maintenance, or non-cleaning.	
Outdoor usage / gardening	Prefiltration	The filter retains large particles, enabling water to be stored for outdoor usage.	

[2] UV sterilisers and dialyzers eradicate micro-organisms (virus, bacteria, algae, yeast, and mould). They disinfect and sterilise water. Active carbon filters, meanwhile, eradicate the substances that colour and make water smell, but do not eliminate micro-organisms.

3. Pumping and conveying the water

A pump is needed to transport the water from the storage tank to the place of usage. There are several models available in the market:

Table 4. Types of pumps, source: WWF Belgium

System	Advantages	Disadvantages
Drainage pump	None	Expensive and requires intensive maintenance.
Centrifugal pump with a hydrophore (pressure boosting) unit	Affordable and reliable	Noisy and there is a risk of bacteria developing on the tank membrane.
Electronic centrifugal multi-speed pump	Less noisy and includes a system that prevents the pump from drying up.	More expensive.
Submerged centrifugal pump	Silent and space-saving as it is installed at the bottom of the tank.	More expensive.

Maintenance and care:

1. **System cleaning:** System cleanliness needs to be checked (roof, gutters, tank) every six months and on a yearly basis the filters need to be cleaned, the tank must be emptied, cleaned and disinfected, and the decanting taps and valves tested.

2. **Drought:** If it does not rain for a long period, the tank must be filled with mains water because it cannot be allowed to dry out. A water level sensor constantly measures the level and sends out a signal to the control unit which fills the tank with a minimum level of mains water.

3. Overflow: The tank may overflow in the event of heavy rainfall. This is why it needs to be fitted with an overflow[3]. It is actually good for the tank to overflow regularly as it removes all sorts of pollutant materials which may float to the surface of the water. It is therefore recommended that you do not install an overly large tank.

4. Allowing overflow water to infiltrate: Where possible, excess water should be allowed to infiltrate into the soil. This is the best course of action in light of the fact that soils are increasingly drying out and groundwater levels are dropping. In order to be able to infiltrate, the groundwater level cannot be too high. However, if this proves impossible, the only other option is to discharge the water into the sewage system.

5. Water supply system: It is normally forbidden to install a permanent connection between a rainwater system and the mains water supply system in order to prevent less pure rainwater from mixing with mains water. The two systems therefore need to be completely separate, with each supply valve being connected to two different pipes, each equipped with its own tap.

5. European member organisations that use these techniques

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that use this system and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

[3] **A tank overflow** is a soakaway installed near to a tank. It receives the water that overflows from the tank.

6. Non-Movement organisations involved in this area

Rainwater harvesting is widely used in regions where rainwater is scarce. For example, in North-East Brazil, where the rainy season lasts three months followed by a nine-month dry season, collecting rainwater is the best way of meeting the population's needs.

Since 2007 in the Flemish regions and in Brussels in Belgium, it has been obligatory to install a storage tank if a house is being built or renovated as a means of reducing drinking water consumption and preventing flooding caused by ground impermeability. In France, homeowners are entitled to use the water that falls on their roofs although restrictions still apply, such as a ban on using the water in bathrooms and for drinking. As there is no Europe-wide regulation, you need to consult the regulations in force in each region.

7. Possible partnerships

In the different regions and countries of Europe, local government provides funding for installing rainwater collection and reuse systems.

Germany is one of the pioneers in this area in Europe with rainwater being used for washing clothes, flushing toilets and watering (Berlin has a large number of systems). Moreover, rainwater recycling is subsidised up to 50% a year in one in every five major cities. Germany is followed in this area by countries such as Belgium, Luxembourg, Sweden and Norway.

In the UK, the Enhanced Capital Allowance (ECA)[4] system enables businesses to claim 100% first-year capital allowances on their spending on certain water conservation plant and machinery projects. The system's website is listed below.

[4] The Enhanced Capital Allowance system is a key component of the UK government's climate change management programme and offers businesses tax breaks in return for investing in plant and machinery that meet set energy-saving criteria.

8. Useful websites

- ✓ WWF practical guide: Living water (French)
- ✓ Rainwater treatment guide (French)
- ✓ Tax credit and other funding for installing harvesting systems in France (French).
- ✓ ECA website (English)
- ✓ UK Rainwater Harvesting Association (English)
- ✓ Rainharvesting systems (English)
- ✓ Spanish water legislation (Spanish)
- ✓ A guide to building and sustainably renovating small buildings: rainwater collection Bruxelles Environnement

Appendix 1 – Photos of the equipment mentioned in the factsheet

1. Different types of tanks

Figure 2. Concrete tanks (buried)

Figure 1. Plastic tanks (ground level)

2. Harvested water filtration and treatment systems

2.1. Drinking water treatment

Figure 3. UV sterilizer for sterilizing stored water

Figure 4. Dialyzer

2.2. Secondary filtration

Figure 5. Active carbon filter

2.3. Primary filtration and prefiltration: Only the filter size changes. Primary filtration is < 10 µm.

Figure 6. Different types of basic filters

3. Pumps

Figure 7. Different types of pumps

Constructed wetlands

Introduction

Obtaining clean water for consumption is becoming more and more difficult, as the world's population is constantly increasing. Conventional chemical treatments generate waste that builds up in the environment and can be hazardous. It is against this background that constructed wetlands (one type of wastewater treatment and also known as wastewater purification) are an alternative to traditional wastewater treatment (using chemicals).

Constructed wetlands treat wastewater naturally using de-eutrophication[1]. They copy natural systems in which micro-organisms, algae and water plants purify and filter. In some systems, water may be moved through tree plantation roots, potentially through short-rotation coppices of willows.

Illustration 1

A eutrophic river. The reverse eutrophication process returns a water body to its normal state.

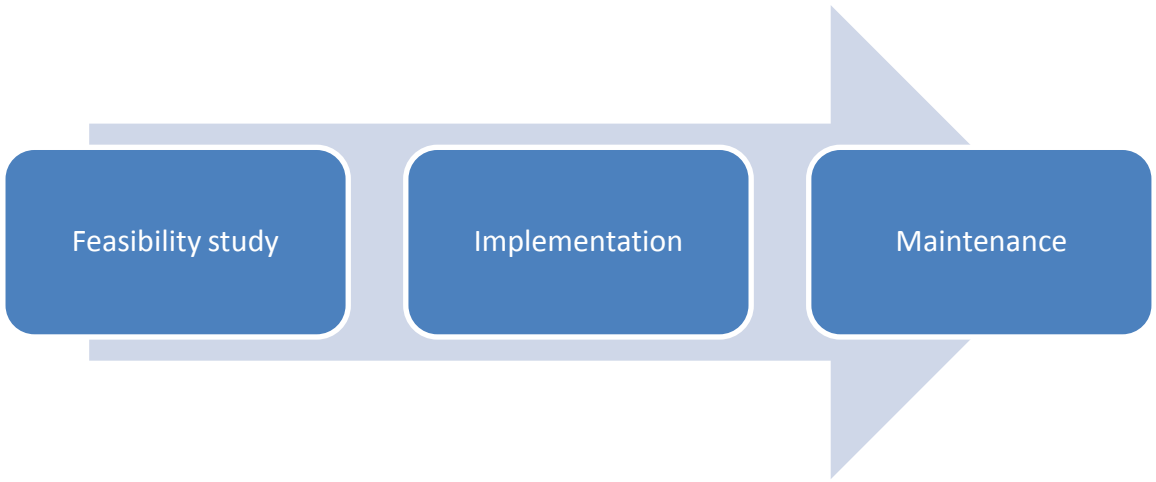
[1] Eutrophication occurs when an aquatic environment is changed and damaged, generally because of the excessive addition of nutrients. Reverse eutrophication or de-eutrophication involves restoring the environment by balancing out the quantity of nutrients in it.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺
Time taken to implement	☺
Budget	☺☺

2. Schedule



3. The main advantages

✓ Wastewater bill savings.

✓ 100% environmentally friendly treatment as it is completely natural and does not generate chemical waste.

✓ Low running cost, as most of the work is done by the plants.

✓ Fits well into the landscape.

4. The main disadvantages

× A constructed wetland feasibility study needs to be carried out by a qualified professional, as no infiltration, which can contaminate the soils and groundwater, must occur.

× Incoming and outgoing water must be periodically analysed because of the health risks of coming into contact with contaminated water.

× A large area is needed: 10-15m² equivalent for each inhabitant.

Implementation

Phase 1 – Feasibility study

A feasibility study with input from competent professionals (engineers and technicians) must be carried out as a constructed wetland is a public health issue.

The study must check some of the factors that will affect the creation of a constructed wetland:

- Available area.
- Ground type (ground may need to be made watertight with clay or a geomembrane).
- Climatic conditions in the region (the chemical reactions of the micro-organisms are helped by average temperatures of 20°C, however a constructed wetland can also function in low temperatures: it just needs to be designed accordingly).
- Type of wastewater that the wetland will have to treat (domestic or industrial).

A constructed wetland must be designed to take advantage of the site's natural features and to keep any disturbance to a minimum. Its shape is dictated by the existing topography, geology and land availability. The project can be rolled out once the study has been completed. Constructed wetland construction costs depend on site constraints. Consequently, it is recommended that you put a figure on the cost based on a preliminary study.

A constructed wetland basically comprises a primary pre-treatment pool and other pools for the actual treatment, the number of which will depend on the characteristics listed above. Gravity is used to send the water from one pool to another, as each pool is lower than the previous one. This means that the water overflows from one pool into another without the risk of it returning to the previous pool.

Table 1. Treatment process phases. Source: Mèze-Loupian[2] constructed wetland

Pool	Purpose
Primary pre-treatment	This pool comprises: - A screen rake placed at the inlet to mechanically separate the largest waste. - A desander that deposits sand and gravel at the bottom of a pit. - A mechanical oil removing zone which retains oil and floating waste using a siphon filter.
Bacterial treatment	Once large materials have been removed, wastewater flows into the first pool where the bacteria will eradicate organic matter via a process called mineralisation. This involves complex organic matter being broken down into simple mineral compounds by a chain of micro-organisms (mainly bacteria).
Plant treatment	Plants then take over from the bacteria capturing the products of mineralisation (mineral salts and CO_2) for their growth (via photosynthesis) while releasing O_2.
Zooplankton treatment	The zooplankton complete the water purification process. They play an important role, as they consume micro-algae and therefore regulate these phytoplanktonic populations.

[2] Link: Mèze-Loupian constructed wetland

Phase 2 – Implementation / operating

Following the feasibility study and installation, constructed wetlands are not complicated to operate. The bacteria and plants purify the wastewater and you only need to check inflow into the wetland.

Sludge from the organic matter breakdown process accumulates at the bottom of the pools and must therefore be periodically removed.

Phase 3 – Maintenance

Maintaining this type of treatment plant is relatively simple, as there is no electrical equipment to be maintained and plant upkeep is not expensive.

Plants need to be mowed and cut. Checking water quality: a range of physical-chemical and microbiological readings need to be regularly taken in the pools. The following are normally analysed:

- Suspended solids.
- BOD_5 and COD.
- Phosphorous.
- Bacteriological pollution.

5. European member organisations that have wetlands

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups, such as Emmaus Navarra in Spain, that use this system and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Examples of constructed wetlands are included in the list of useful websites found below.

7. Possible partnerships

Check with local universities if there are plans for partnerships under which the universities would supply information, deliver lectures and even loan out students to help with the implementation of this type of project.

8. Useful websites

- ✓ Rochefort constructed wetland: the biggest in Europe (French)
- ✓ Wetlands handbook (English)
- ✓ Using plants to treat wastewater (French)
- ✓ Wastewater treatment plants (French)
- ✓ Practical aspects when building a constructed wetland (Spanish)
- ✓ Constructed wetland association (English)
- ✓ Constructed wetlands (English)
- ✓ Mèze-Loupian constructed wetland, Languedoc Roussillon region, France (French).

Dry toilets

Introduction

Dry toilets, also known as composting toilets, litter toilets and bio-controlled litter toilets, are toilets that do not use water to convey excrement to wastewater treatment plants. Excrement is used to make compost or for biomethanization.

There are two main types:

1) Toilets in which stools and urine are mixed (fermentation begins in the container) and

2) Toilets in which they are separated (composting starts in a special chamber).

Apart from not using water, dry toilets aim to recycle / reuse matter that is normally discharged into the sewers and requires treatment.

European legislation requires all dwellings to have a toilet with a flush system connected to the sewage network or an independent purification system. However, this does not mean that a standard toilet must be used, meaning that everyone can have dry toilets as long as composting is properly managed and does not generate any pollution.[1]

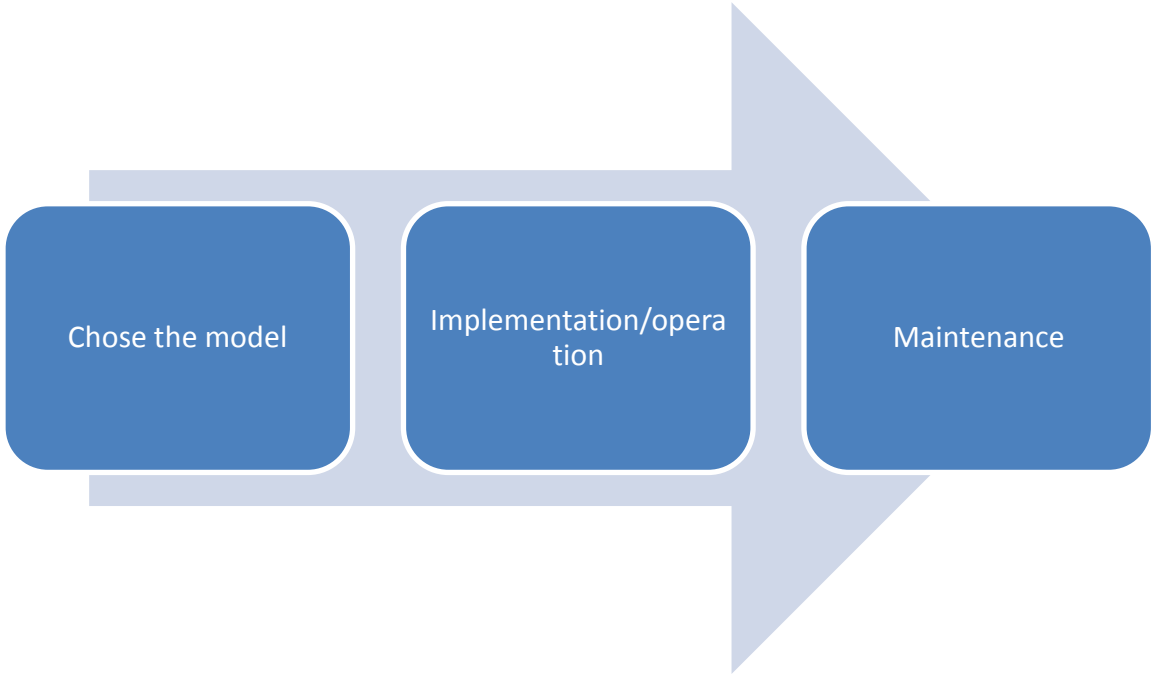
[1] Please read Waste Factsheet 21 (Composting) for more information.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺

2. Schedule



3. The main advantages

✓ Saves water: dry toilets save three to 12l of water each time they are used compared with a standard flush system.

✓ Reduces eutrophication: when discharged by traditional flush toilets, stools and urine release large amounts of nitrogen and phosphorous into the water, thus significantly contributing to damage to aquatic ecosystems.

✓ Excrement is recycled without the need for expensive and polluting transport.

✓ Produces compost that can be used in the garden.

4. The main disadvantages

× Need to empty the toilet pan.

× Need to buy sawdust.

Implementation

Phase 1 – The main types of dry toilets

There are two main types of dry toilets:

1. Composting dry toilets: urine and solids (excrement and toilet roll) are collected and treated together.

2. Urine-diverting dry toilets: urine and solids are separated and treated differently.

Both categories have several sub-categories, each with their particular features: positive and negative points, volume collected and respective solid and / or liquid sub-products. **Carefully check your group's needs in order to choose the best option for you.**

Here are a few examples of dry toilets:

Table 1 Source: http://www.toiletteacompost.org/IMG/pdf/Guide-Annexes.pdf

Toilet type	Bulking agent added to the toilet	Emptying frequency (for four to five people)	Sub-products
Bio-controlled litter toilet	After each usage	Once a week to once a day (depending on container capacity).	Mix of carbonated litter imbibed with urine, fresh faeces and toilet roll.
Compact composting toilet	In accordance with the manufacturer's instructions (around once a day)	Once a month or even less.	a) A few litres of pre-compost. b) A few litres of leachates.
Large volume or multi-chamber compost toilet	Depends on the model: after each usage, from time to time, or only on setup.	Depends on the composting volume (from several weeks to several years).	a) Several dozen litres of compost per person per year. b) From a few litres a month to 200 litres per person per year.
Compact urine diverting toilets	Not needed. At the bottom of the container to facilitate emptying. Potentially after each time stools are passed on visual grounds.	Once or twice a month.	a) Mix of faecal matter, fresh / dried out, toilet roll (+ a small amount of optional litter). b) Large volume of urine (more or less 1l per person per day) discharged into the household wastewater or stored for use in the garden.
Large storage volume or multi-chamber urine-diverting toilets	As above.	Depends on the storage volume (from several weeks to several years).	a) Several dozen litres of dehydrated or composted faeces (depending on the system) per person per year. b) Large volume of urine (more or less 1l per person per day) discharged into the household wastewater or stored for use in the garden.

Phase 2 – Using the dry toilet

A litter replaces the flush system. It is made up of sawdust and woodchips and controls unpleasant odours by absorbing liquids. Just one or two ladlefuls of litter need to be added each time the toilet is used to cover up excrement.

Illustration 1 Examples of dry toilets

How often a dry toilet needs to be emptied depends on the container size and the number of people using it. However, an indoor toilet needs to be emptied once a week as a minimum requirement. After a week, the litter – excrement mix tends to settle too much at the bottom of the container and is no longer sufficiently aerated. This means that composting comes to a stop and smelly fermentation takes over.

Phase 3 – Maintenance

Containers fitted in dry toilets should preferably be made of stainless steel or enamelled iron as plastic absorbs odours.

Once you know how often to empty the containers, you simply need to read up about composting (see Waste factsheet 21 on Composting).

5. European member organisations that have dry toilets

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups, such as La Poudrière in Belgium, that use this system and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Dry toilets have started to be used in towns as public toilets and at private events and festivals as an alternative to chemical toilets which use up a lot of water and are well-known for their disgusting smell.

7. Useful websites

- ✓ Agua Tuya Foundation manual: How to build a dry toilet (Spanish)
- ✓ Finnish Dry Toilet Association (English)
- ✓ Dry toilet sub-product good composting practice guide (French)
- ✓ Dry toilet hire for events (in France)

FOOD

2

Organic food

Introduction

"Organic farming is a specific form of agricultural production and is a set of agricultural practices that respect ecological balances and farmers' independence.

It aims to sustain soils, natural resources and the environment and to keep farmers in business, and is often considered to be a means of fostering sustainable farming."[1]

Organic food must be produced in accordance with the principles of organic farming. The European Union organic label certifies that the product bearing the label complies with the EU's organic farming regulations. The EU introduced a new green logo for organic products on 1 July 2010.

Illustration 1. The European Union's organic label since 1 July 2010

As a minimum requirement, the logo guarantees that:

- At least 95% of the product's ingredients of agricultural origin have been organically produced.
- The product complies with the rules of the official EU inspection scheme.
- The product has come directly from the producer or preparer in a sealed package.

[1] Definition on the website of the French Agency for the Development of Organic Farming (click on the link).

- The product bears the name of the producer, the preparer or vendor and the name or code of the inspection body.

GMO[2]: A conventional or organic product containing more than 0.9% of GMO must be labelled as such. There is no need to inform consumers if GMO content is below that level.

However, each EU Member State is free to strengthen its national legislation on the labelling of organic products.

How to implement this practice

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺☺
Budget	☺☺

2. Schedule

[2] GMO: Genetically Modified Organisms, incompatible with the concept of organic farming and with consumer perception of organic products (definition contained in EU regulation 834/2007).

3. The main advantages

✓ Free of chemical substances and GMO that can be harmful to health and the environment.

✓ Can contribute to the development of the local economy and small-scale farmers.

4. The main disadvantages

× Price: Organic produce is generally more expensive than food produced by conventional farming.

× Organic products not available in the market: it can be quite difficult to source these products. Why are they difficult to find? Lobbying by the big agri-food companies ensures that organic products are kept away from supermarket shelves and therefore become more expensive (low demand).

Implementation

Phase 1 – Searching for solutions

The group's needs must be identified:

- Food that the group is interested in purchasing.
- How often it would need to be bought.
- The most heavily consumed foodstuffs.

Once you have this information to hand, you can plan and organise the group's requirements, while keeping to the available budget.

Phase 2 – The main organic foodstuffs on the market

- Fresh fruit and vegetables: tomatoes, carrots, potatoes, pears, strawberries etc.

- Groceries: Tea, juice, pâtés, breakfast cereals, chocolate bars, biscuits, yoghurt etc.
- Dairy products: milk, yoghurt, cheese etc.
- Meat: pork, beef, chicken, turkey etc.
- Other: wine, bread, stewed fruit etc.

Phase 3 – How to eat organic

A few tips explaining how you can eat organic for less:

1. Make your own: If you can dedicate a little time, buying the ingredients and making the products yourself can be a viable alternative. For example, yoghurt can be made simply using organic milk.

2. Buy organic products in specialised shops: The price per kilo of pre-packaged rice, for example, can be double that of rice bought loose. Fruits and vegetables, wholegrain cereals, muesli and flakes, pulses, sugar, flour, oilseeds, dried fruit, biscuits, and sometimes even olives, salt, condiments and even washing powder. All these basic products can be bought loose for less.

Buying a set quantity of a product in a paper bag for a recipe (instead of buying a pre-packaged packet of 500g) represents a saving. In addition, there is no economic or environmental advantage to using packaging and recycling it. In the end, it is consumers who pay for recycling, as the cost is passed on to them, and not the manufacturer (although the green Eco-packaging logo indicates that the recycling tax has been paid by the manufacturer).

3. Buy fruit and vegetables directly from the producer: Seasonal and locally produced[3] fruit and vegetables can, depending on your location, be bought directly from the

[3] See Food factsheet 2 “Local Produce”.

farmer, which sometimes and even frequently enables you to make savings: AMAP4, baskets and pick your own are all options. Organic wine, meat, cheese and eggs, among other produce, can also be purchased in this way.

5. European member organisations that eat organically

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that eat organically and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Since October 2007, one of the food-related objectives set by France's *Grenelle de l'Environnement*[5] was for 20% of the food served in public sector canteens (hospitals, universities, prisons, civil service offices) to be organic by 2012. The objective has not yet been achieved. However, it constitutes a first step, as it sets an example for young people about choosing the food they eat and also because it is a way of starting to change people's habits.

7. Possible partnerships

You can forge a partnership with small local farmers who do not use chemical substances, therefore linking organic and local produce. If you have no producers close by,

[4] AMAP: Association campaigning to preserve small-scale farming. In France, it revolves around a partnership between a group of consumers and a local farm. Farm produce is regularly distributed among the group of consumers (usually on a weekly basis).
For additional information, please read Food factsheet 2 "Local Produce".

[5] The Grenelle Environment Round Table was a series of political meetings held in France in September and October 2007. The aim of the meetings was to take long-term decisions on the environment and sustainable development, particularly to restore biodiversity by creating green and blue corridors and regional environmental coherence schemes, while reducing greenhouse gas emissions and increasing energy efficiency.

another alternative is to search further afield; however you need to check if the product really bears a label certifying that it is organic.

8. Useful websites

- ✓ European regulations since 2007 (French)
- ✓ Organic food Finland (English and Finnish)
- ✓ Organic food outlets and environmentally-friendly products and services directory (French)
- ✓ Organic foodstuffs labelling guide (French)
- ✓ UK organic food directory (English)
- ✓ Organic food and organic products (Spanish)

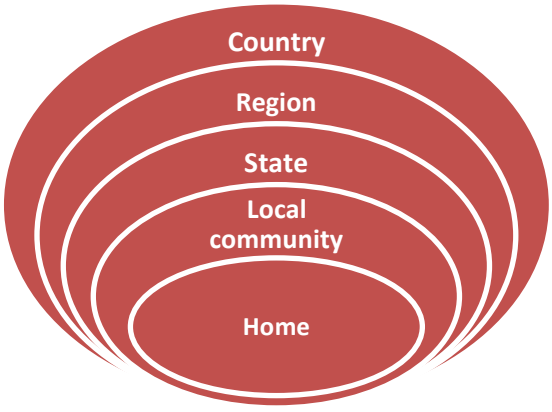
Local produce / Produce supplied by local cooperatives

Introduction

With globalisation and increasingly efficient transport systems, it has become commonplace to buy products (particularly foodstuffs) that do not exist in certain regions of the world and or that are cheaper than those produced locally.

However, this has a significant environmental impact and the nutritional value of these foodstuffs is dubious: transporting food long distances generates a large amount of CO2 emissions[1]. In addition, exporting food causes it to lose its nutritional quality.

Local produce can be depicted in the form of concentric circles that begin with food made at home. The following rings represent food produced in the local community, then the state, region and country.



There are several benefits to producing locally: being self-sufficient for some foodstuffs, helping to boost the local economy, and apart from that, this type of activity can

[1] CO2 is one of the main gases responsible for creating the greenhouse effect (which is beneficial to humankind up to a certain level: living beings would die of cold without this phenomenon), however, if produced in excess, this gas can worsen climate change. As transport and deforestation are the main aggravating factors of this worldwide problem, if we buy food from faraway regions, we are helping to increase emissions and therefore worsen the problem of global warming.

also be therapeutic as it enables those working in the vegetable garden to rebuild their lives through work.

For groups that do not have a kitchen or that do not cook on their premises, buying locally from third parties is a way of supporting the local and social economies.

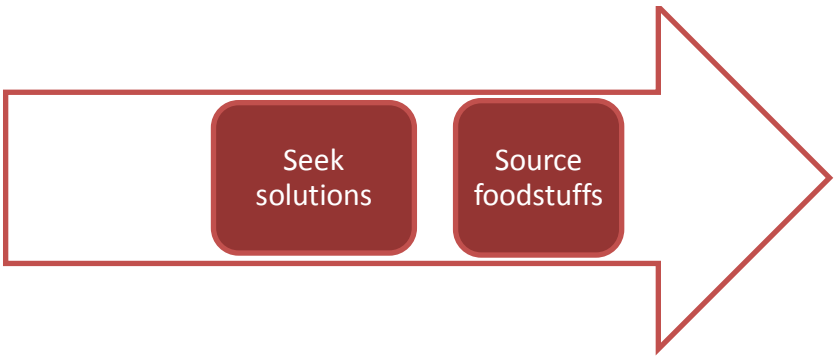
In all instances, the aim is to champion an agricultural model that is as environmentally-friendly as possible (no usage of chemical products, crop rotation, growing multiple crops, no excessive ploughing etc).

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺

2. Schedule



3. The main advantages

✓ Cuts carbon emissions.

✓ Reduces the amount of packaging used.

✓ Food is healthier if produced without chemical substances[2]. The more miles that food racks up, the more its vitamin and mineral content drops.

✓ Helps boost the local economy by creating jobs.

4. The main disadvantages

× Food production may vary from season to season: rainfall varies each year depending on the climate. Periods of drought and heavy rainfall affect production, which means that the products that the consumer orders cannot be delivered regularly.

Implementation

Phase 1 – Searching for solutions

As for organic food, you firstly need to check the group's needs:

- Food / meals that the group is interested in purchasing.
- How often it would need to be bought.
- The most heavily consumed foodstuffs.
- The budget available.
- Whether associations or local farmers that could meet the group's requirements actually exist.

Phase 2 – How to find local suppliers

In France, for example, local food distributors can form part of a structure that is called AMAP[3]. However, other associations bring together consumers and farmers so that consumers can buy locally. Information can be found on the internet. **We have listed below a number of directories of associations in Europe that work in this area.**

[2] For additional information, please read Food factsheet 1 "Organic food".

If the group wishes to buy full meals, it can get in touch with other local associations, for example associations that help people with disabilities, drug users and the homeless. Producing meals or growing vegetables is sometimes their means of survival.

5. European member organisations that eat local produce

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that, for example, have a partnership with a local association of people with learning difficulties who supply the community's daily meals. Their contact information is also available on the website enabling anyone wishing to discuss the topic to contact them directly.

6. Non-Movement organisations involved in this area

There is now increasing demand for local produce. For example, the French AMAP[3] sometimes report that they have waiting lists for those wanting to receive the weekly and monthly food baskets. The benefits of local and therefore fresh and healthy produce are therefore increasingly attracting the attention of society at large.

Suppliers and other social cooperatives / associations sell meals or baskets to the local population, with this constituting an additional source of income, and are therefore able to meet the requirements of other associations, such as Emmaus.

7. Possible partnerships

Partnerships can be developed with local fruit and vegetable producers and with local associations that supply meals / baskets on a weekly or monthly basis. Each European

region works differently, for example in France the AMAP[3] have different distribution systems depending on the member consumers. Delivery premises, payment methods and products vary depending on the season and the agreements reached between the producers and the consumers.

8. Useful websites

- ✓ Directory of AMAP in France (French)
- ✓ Find local food markets (English)
- ✓ Eat local (English)
- ✓ Non-profit cooperative for ethical consumption (Spanish)
- ✓ Film about the harmful effects of intensive farming / existing alternatives: http://www.solutionslocales-lefilm.com/ (French)
- ✓ http://www.foodincmovie.com/about-the-film.php (English)

[3] AMAP: Association campaigning to preserve small-scale farming. In France, it revolves around a partnership between a group of consumers and a local farm. Farm produce is regularly distributed among the group of consumers (usually on a weekly basis).

Fair Trade produce

Introduction

There is no legal definition of Fair Trade, however, internationally; the main organisations that work in this area came to an agreement in 2001 on a common definition:

"*Fair Trade is a commercial partnership whose goal is to achieve greater fairness in world trade. Fair Trade leads to sustainable development by offering better trade conditions and safeguarding the rights of marginalised workers and producers, particularly in developing countries.*"[1]

Therefore, one of the principles of Fair Trade is the guarantee given to small producers that their products will be sold at a price that covers the costs of socially and environmentally sustainable production. It also guarantees relative price stability and the application of conditions and payment periods, and even the option of pre-production financing, which saves small farmers and craftspeople from having to sell their products cheaply or take out loans at loan shark rates.

Fair Trade labelled products are guaranteed to be quality products and are often organic.[2] They are produced in a way that respects local know-how[3] and the environment.

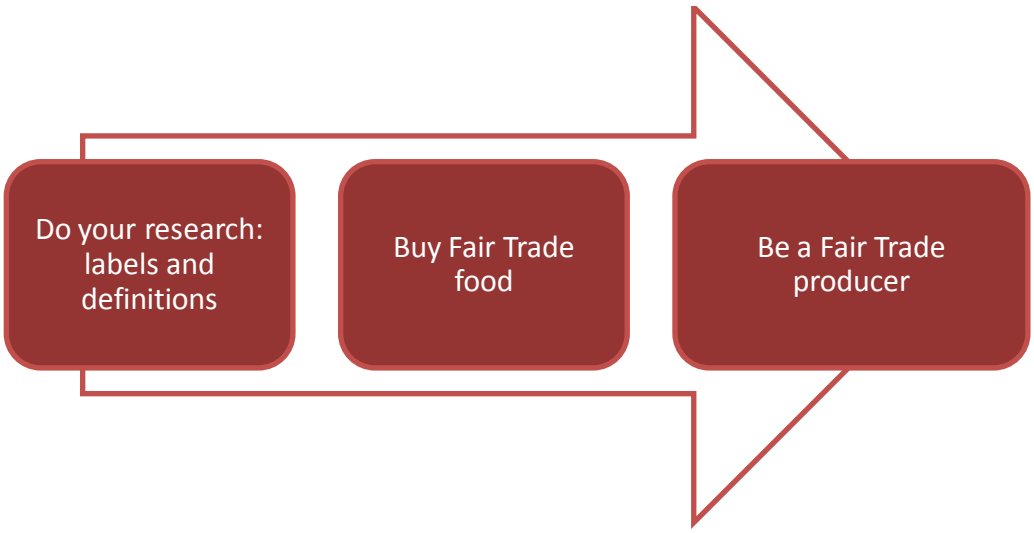
[1] Artisans du Monde was founded in 1974 and pioneered the French Fair Trade movement. The movement had started to emerge in 1970-71 and took shape following an appeal made by Abbé Pierre to help Bangladesh, which was beset with famine and gripped by a civil war, with twinning committees and Third World Shops being created. In 1974, the first Artisans du Monde shop opened its doors at 20 rue Rochechouart in Paris.
[2] For additional information, please read Food factsheet 1 "Organic food".
[3] For additional information, please read Food factsheet 2 "Local produce".

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule



3. The main advantages

- ✓ Helps to care for the environment.
- ✓ Supports a less polluting form of farming.
- ✓ Eat more healthy food.
- ✓ Contribute towards the economic and social development of local producers.

4. The main disadvantages

× The transport issue: some foodstuffs come from faraway regions, such as tea from Sri Lanka, which increases their carbon footprint[4]. It should be noted that some Fair Trade products are covered by a carbon offsetting scheme.

Fair Trade products are not necessarily more expensive than conventional products and many of them can be found in supermarkets.

Implementation

Phase 1 – The different Fair Trade food labels

Fair Trade products and organisations comply with a set of criteria and can also be identified by labels, logos and brands. The following table contains a list of the labels and organisations involved in selling Fair Trade foodstuffs in Europe:

[4] The *Bilan Carbone* (or carbon footprint assessment in English), is a trademark registered by ADEME (French Environment and Energy Agency) and is used to calculate greenhouse gas emissions. The tool was developed by the agency. Using easy to obtain data, the *Bilan Carbone* enables the direct and indirect emissions of a professional, economic or other type of activity to be assessed. Available on http://www.dictionnaire-environnement.com/bilan_carbone_ID5571.html

Table 1 – Labels and organisations that certify Fair Trade products

Label / Organisation	Name	What it means in practice
	Max Havelaar	The Max Havelaar label was created in 1988 in order to help Latin American coffee producers. It is now the leading Fair Trade products certification label worldwide.
	WFTO **(Fair Trade Organisation)**	The FTO guarantee is issued by the WFTO (ex-IFAT, International Fair Trade Association) and covers structures whose main business area is Fair Trade. The logo makes it easier for all the trade partners to identify them. The guarantee involves a three-stage process: self-assessment, mutual assessment and external inspections. The charter of principles and methodology are designed by the members of the organisation (2/3 are from the developing world).
	Bio equitable	Aims to bring together Fair Trade and organic farming guarantees in the food production industry. The logo can be found on foodstuffs, textiles and cosmetics.
	Ecocert ERS	The Ecocert ESR logo (standing for Fair, Solidarity-based and Responsible in French) can be found on foodstuffs, cosmetics and textiles. The Ecocert logo has two unique features: a very strong environmental component and a stated desire to guarantee fair practices throughout the production chain (producers, processors, exporters and importers). The standard complies with the FINE[5] definition of Fair Trade and includes a guaranteed minimum price covering production costs and enables producers to make a profit and improve their living conditions. Adhering to this logo's standards means that a voluntary policy of good farming practice and transition to organic farming is put in place.

[5] FINE was founded in 1998 and is an association of the four international Fair Trade organisations based in Europe: FLO, WFTO (ex-IFAT), NEWS (progressively being replaced by WFTO Europe) and EFTA. This forum facilitates the exchange of information and helps the members to agree on common stances enabling Fair Trade to be consolidated and developed worldwide.

Phase 2 – Buy Fair Trade foodstuffs

Regularly buying Fair Trade products helps to secure the long-term future of Fair Trade industries and reduce cost prices.

Look for local or international labels on the packaging of the food you want to buy, as these guarantee their provenance.

Some countries bring together local organic food producers and Fair Trade food on the internet, with associations acting as the link. In France, the AMAP[6] are able to meet the demand for Fair Trade products or simply for organic and / or locally produced products.

Phase 3 - How to get involved in Fair Trade as a producer

To get a product certified by a label as being Fair Trade, you need to follow the recommendations and requirements of the label in question. For example, to be Max Havelaar certified (see page 4), a product must meet the following seven conditions[7] :

1. Buy raw materials or semi-finished products at a minimum price from Max Havelaar accredited producers or importers.
2. Pre-production financing equating to a minimum of 60% of the price and payment of a development subsidy to the cooperative.
3. Commitment to establish a long-term relationship with the cooperative.
4. Place the Max Havelaar logo and explanatory wording on all packaging.
5. Max Havelaar and the company must sign a licence agreement.
6. Must make quarterly declarations and allow physical in-company checks.
7. Pay a minimal six monthly licence fee of €250 to Max Havelaar.

[6] *Associations pour le Maintien de l'Agriculture Paysanne*: their goal is to encourage small-scale and organic farming which finds it hard to survive in the face of agro-industry.
[7] Please go to http://www.fairtrade.net/ for more information.

5. European member organisations involved in Fair Trade

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that eat Fair Trade products and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations in Europe

Tara Projects[8] based in Delhi in Northern India is actively involved in providing production and marketing support to craftspeople based on the principles of Fair Trade, while meeting the community's needs by developing local craftspeople, while safeguarding their human rights, carrying out general awareness raising, delivering vocational training and informal training to ensure human dignity. With the support of Naya Jiwan[9] (a Danish organisation), this association funds and runs informal schools and vocational training centres, as well as several adult literacy centres, and apart from their flagship initiative they run numerous campaigns against forced child labour, illiteracy, unfair trade practices and in support of the environment, ecology and education for women.

7. Possible partnerships

Local associations can support an initiative to buy or sell Fair Trade food. Each region can find out online about the organisations that can help with this initiative. Contacts can also be found on the following websites.

[8] For more information, please visit: http://taraprojects.com/

[9] Danish organisation that supports several projects around the world in a range of areas, including children's and young people's education, village development and organic farming. Find out more: http://www.nayajiwan.dk/

8. Useful websites

Artisans du monde: working for Fair Trade (French)

Short guide to labels (French)

Equimercado: Adsis Foundation (Spanish)

Distance learning: Food Fair Trade (Spanish)

World Fair Trade Organisation (English)

CTB[10] – Fair Trade for development (French, English and Dutch)

[10] CTB: The Belgian Development Agency, which aims to promote Fair Trade and sustainable trade with developing countries and offers 'aid for trade'.

Stockbreeding

Introduction

Stockbreeding is a very ancient practice which involves managing domestic (and sometimes wild) animals in order to increase their number and meet the needs of a household or to make a profit. The animals in their entirety are known as livestock.

This factsheet will focus on food products. Some of the main products are meat, milk, eggs and honey. In addition to producing food, some non-food activities are also possible, such as using animals for traction, producing fur, wool and leather, and compost can also be made using manure and can be put to use in a garden or vegetable garden.

One of the controversies aroused by stockbreeding should be highlighted at this point: namely, the emission of greenhouse gases, mainly from ruminants during their digestive process and by the crops used as feed, the planting of which contributes to deforestation[1].

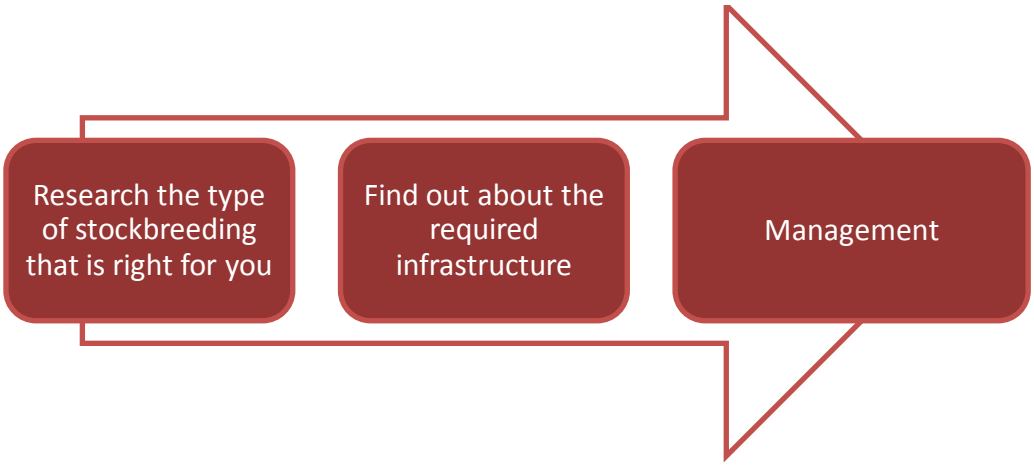
Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺

2. Schedule

[1] For more information about this stance:
http://www.one-voice.fr/alimentation-et-vetements-sans-barbarie/l-elevage-met-la-planete-en-danger/ (website in French).
http://timeforchange.org/are-cows-cause-of-global-warming-meat-methane-CO2 (website in English).
http://www.fao.org/newsroom/es/news/2006/1000448/index.html (website in Spanish)



3. The main advantages

✓ Food self-sufficiency.

✓ Make an economic profit with any surplus or all of the production.

✓ Use the manure produced by the animals to make compost.

4. The main disadvantages

× Livestock breeding requires large areas of land.

× The emission of greenhouse gases by the animals, the meat industry and the crops used to feed these animals and which lead to deforestation.

Implementation

Phase 1 - What type of stockbreeding is right for you?

The following table lists the products produced by the main types of stockbreeding and the amount of space needed.

Table 1 The different types of stockbreeding

Type	Products	Some of the advantages
Cattle	▪ Food products: milk and meat. ▪ Other products: leather, traction and manure for compost.	▪ The numerous potential sub-products (meat, leather, traction). ▪ Highly adaptable to difficult climatic conditions.
Goats	▪ Food products: milk and meat. ▪ Other products: leather, fur and manure for compost	▪ Able to resist heat and cold. ▪ Easily adapt to all types of landscapes. ▪ Good milk producers: 14.1l/year/kg of goat.
Pigs	▪ Food products: meat. ▪ Other products: bristles, skin and manure.	▪ Diet is not restrictive[2]. ▪ Grow quickly. ▪ A highly prolific animal.
Poultry	▪ Food products: meat and eggs. ▪ Other products: feathers and droppings.	▪ The building does not take up much space. ▪ Easy to look after.

Phase 2 – Infrastructure

There are recommendations for each objective (type of product). You must contact your local authority to find out about urban planning regulations in the event of building permits or other types of authorisations being required. For example, in France, the regulations depend on the number of fowl present on the farm.

The following table contains information about the infrastructure needed to start stockbreeding. A good water supply is also vital for all types of stockbreeding.

[2] See table 3 for more information.

Table 2 Infrastructure needed for cattle, goat, pig and poultry breeding

Type	Average area required	Special requirements
Cattle	▪ Large area: minimum 8-20m2 per animal.	▪ Dry rest area that is sufficiently comfortable for each animal.
Goats	▪ 1m² indoors (for sleeping).	▪ Well ventilated, dry and well drained area to protect the goats from the rain, damp, wind and dust.
Pigs	▪ 5-6m² per hog (male) and 9-12m² per sow (female) with their piglets.	▪ Buildings should be East-West facing. ▪ Building floors should be made of cement and should be largely open along the sides. ▪ The sleeping area should be covered by metal sheets, straw or matting.
Poultry	▪ Around 1m² for ten birds.	▪ Temperature controlled building that must be east-west facing in order to avoid solar radiation as much as possible, as fowl are physically sensitive. ▪ Special sleeping areas: raised and with a minimum distance so that droppings do not fall on the other birds.

Phase 3 – Stock management

Anyone interested in this practice is advised to visit a farm. There are numerous production methods: the stockbreeder's aims need to be taken into account when choosing one. Keeping stables or sleeping areas clean by changing straw bedding every day is vital, as is making use of the services of a vet.

The following table provides details about stock management.

Table 3

Stock management

Type	General management	Feed
Cattle	▪ Cattle must be periodically vaccinated.	▪ Pasture or special cattle feed.
Goats	▪ A wormer must be administered in order to prevent stock losses.	▪ Goats tend to eat small bushes. However, it is recommended that this is supplemented by a maize based feed.
Pigs	▪ Vaccinations depend on the opinion of a vet who will say what diseases the pigs may contract.	▪ Feed is not sophisticated as pigs are omnivores, however cereal-based and mineral rich feed is strongly recommended.
Poultry	▪ The building must be temperature controlled, and wormer must be administered regularly to prevent diseases.	▪ Proteins and calcium are vital: they guarantee weight gain and good egg production. Poultry feed is normal based on grains.

5. European member organisations that stockbreed

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that stockbreed and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

You can find the websites of several European breeder associations on the internet: from cattle and goat breeders to snail breeders.

However, it is easier to find out more about stockbreeding by personally visiting farms in your region. Information can be obtained from the local authorities, universities and even in the supermarket and butchers where you do the shopping.

7. Possible partnerships

National agricultural, veterinary and / or zootechnical colleges and institutes offer information about training courses or scientific research partnerships, enabling you to obtain advice or support. The following list of websites may be useful to you.

8. Useful websites

- ✓ Charter of good stockbreeding practices (French)
- ✓ IDELE Stockbreeding Institute – France (French)
- ✓ Department for agriculture, food, fisheries, rural life and planning – France (French)
- ✓ Spanish Department of Agriculture, Food and the Environment (Spanish)
- ✓ Spanish Government - Funding measures for farming and stockbreeding (Spanish)
- ✓ Master's degree in agriculture, stockbreeding and forestry in Andalucia - Spain (Spanish)
- ✓ European Master's degree in Animal Breeding and Genetics (English)
- ✓ UK Department for the Environment, Food and Rural Affairs (English)
- ✓ Stockbreeding in Europe: trade fairs country by country (multilingual)

Organic gardening

Introduction

Organic gardening is a type of gardening that is done without using chemical fertilisers and pesticides in order to eradicate their harmful residues from produce. Organic gardening helps to conserve soils and groundwater bodies and is conducive to good health.

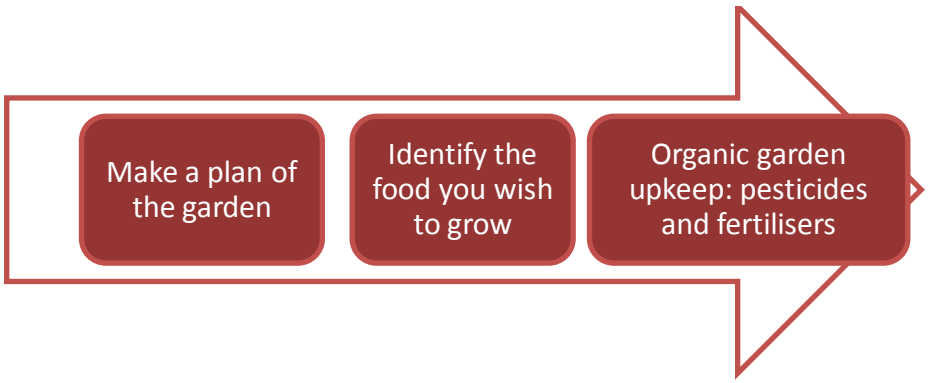
This factsheet contains tips for those wanting to replace foodstuffs that contain chemicals and examples of Emmaus groups in Europe and organisations outside the Movement with some experience in this area.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺☺
Budget	☺☺

2. Schedule



3. The main advantages

✓ No chemical substances or GMO that can be harmful to health and the environment.

✓ Organic fertilisers improve soil condition.

✓ Gardening can be a relaxing and therapeutical activity.

4. The main disadvantages

× Organic fertilisers contain fewer nutrients than chemical fertilisers.

Implementation

Phase 1 – Garden plan

The first step towards creating an organic garden is choosing its location: the garden's shape, orientation, soil type, height, shady areas at midday (this information can be helpful when choosing plants). A flat – to facilitate uniform watering - and sunny plot – so that plants grow bigger – is ideal for the patch.

Siting the plants in the selected area:

- Crop rotation: Crop rotation involves dividing the garden into several square sections and bringing together vegetables with the same type of needs on the same bed, and alternating bed location every year.

Crop rotation makes for a richer and more fertile soil as each vegetable crop needs specific nutrients. Rotation is recommended due to its ability to control diseases, as it enables the invasion to be limited, as vegetables will not be in the same place the following year. The following diagram shows how a vegetable patch can be planned out:

Bed 1: Leguminous plants, grain vegetables and vegetable fruits: they enrich the soil with nitrogen. Examples include peas, beans, broad beans and melons.

Bed 2: Leafy vegetables, such as cabbage, cucumbers and potatoes, which require a lot of nutrients.

Bed 3: Root and bulb vegetables that obtain their nutrients from deep down in the soil. Examples: onions, turnips, beetroot and radishes.

Bed 4 is resting (lying fallow) but can be used to plant green fertilisers. A fifth bed can be used for perennial vegetables (artichokes, rhubarb, asparagus and even tomatoes) and strawberries without the need for rotation.

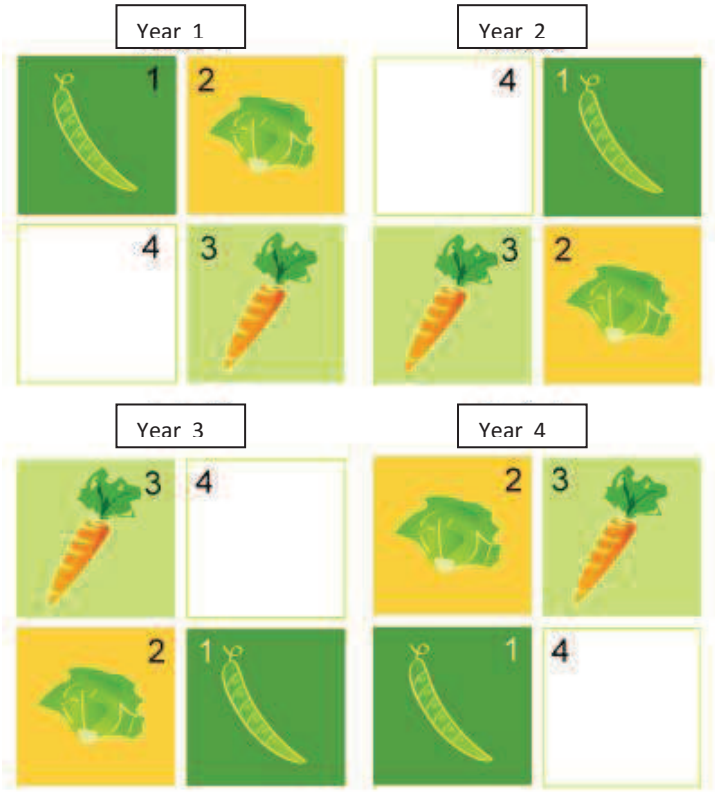


Diagram 1 Sample crop rotation diagram.

Source: jardinage-biologique.com

However, this technique is only valid for large areas. Please refer to the following diagram if you are planting out a small garden.

Phase 2 – What to grow

The following calendar lists a number of vegetables and their respective growing seasons. It should be noted that this is general information and that each growing year may be different due to there sometimes being more rainfall and it sometimes being hotter.

The following colours and wording are used to identify the seasons.

Table 1 Colours / wording used to denote the seasons in table 2

Spring	Summer	Autumn	Winter
March, April, May	June, July, August	September, October, November	December, January, February

Table 2 Vegetable growing seasons. Source http://www.jardin-a-manger.com/travauxdumois/calendrier.htm

Plant family	Vegetable	Sow	Plant	Harvest
Solanaceae	Aubergine	Indoor Feb to Apr Sow outdoors in the earth in warm areas Apr - May	July – Oct	Aubergines like hot weather, avoid growing them if it is consistently too cold, and if it is quite cold, put back the dates listed opposite.
Brassicaceae (Cruciferae)	Broccoli	In the earth in a nursery from May to June	June to Aug	October to May
Apiaceae (umbelliferae)	Carrots	Undercover from Feb to March Planted out from March to July	-	June to November
Brassicaceae (Cruciferae)	Summer, winter and autumn cabbage	Sow outdoors in a nursery from Feb to June	April to July	June to March of the following year
Cucurbitaceae	Cucumbers and gherkins	Indoor from March to April Planted out in April to June	Plants sown indoors should be planted out after approx two weeks, while those sown outdoors should be pruned.	July to October
Cucurbitaceae	Courgettes	Indoors in April Sown outdoors in the earth from April to June	May - June	Mid-July to November
Fabaceae (leguminosae)	Spinach	Depends on the variety: in the earth from Aug to Oct or Feb to April	-	Three months later
Alliaceae	Green beans	Sown in the earth from April to Aug	-	June to October
Solanaceae	Potatoes	Sow potatoes from March to April	-	June to September

Phase 3 – Organic garden upkeep: substituting chemical substances

1. Organic fertilisers

Compost, manure or green fertilisers are used for fertilisation according to the needs of each plant or vegetable: each unused bed is sown with green fertiliser (mustard, clover, spinach, rye, peas, lupin, in the case of an organic vegetable garden) depending on the plot and the season, or weeds are simply allowed to grow so that the soil is covered and is not left 'washed out' by rain. In addition to protecting the soil, green fertiliser produces humus and works it thanks to its roots.

Another option for organic fertilisers is the compost obtained from dry toilets or other sources,[1] such as composting food waste.

2. Organic pesticides

Organic gardening uses natural pesticides; however you should not lose sight of the fact that they too have an impact on the environment. They must therefore be used very sparingly.

Sulphur and copper are two effective ways of preventing disease. It is very important not to apply too much nitrogen or insufficiently decomposed compost in order to prevent disease.

To combat excessively large populations of pests, you can make use of options such as predators for the insects, traps and barriers that prevent them from reproducing. If these options do not work, using organic pesticides is the fallback option. An organic garden, as its name indicates, is a natural garden. *It can be managed but cannot be controlled.* Insects, birds and even 'weeds' have their place and help to keep this small ecosystem balanced.

5. European member organisations with organic gardens

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups with organic gardens and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

[1] For more information, read Water Factsheet 9 on *Dry Toilets* and Waste Factsheet 1 on *Compost.*

6. Possible partnerships

You can use the compost produced by others if your group does not produce enough compost to be used as a fertiliser.

Local educational establishments specialising in agriculture, biology and other subjects may also provide information about the types of crops recommended in the region, the local climate and insects that are present locally, which can help when drawing up the plan of your organic garden.

7. Useful websites

- ✓ List of fruit and vegetables and their growing seasons (French)
- ✓ Organic garden (English)
- ✓ Organic pesticides and fertilizers guide (English)
- ✓ Organic food outlets and environmentally-friendly products and services directory (French)
- ✓ Gardening directory (French)
- ✓ Organic Gardening Association (English)
- ✓ Step by step guide to creating an organic garden (Spanish)
- ✓ Organic community (Spanish)
- ✓ List of organic fertilisers (Spanish)

Seasonal produce

Introduction

Each plant grows in accordance with its own growing cycle which also depends on the local climate. Eating seasonal products means respecting the rhythms of nature and enjoying the taste of a fruit or vegetable that has ripened properly.

Another plus point of seasonal produce is that it is generally cheaper, as the products are not grown in heated greenhouses and can be grown locally[1].

Forms and recipes need to be varied so that people do not become tired of seasonal vegetables. Adding spices or aromatic herbs to dishes can also help to create unique flavours.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule

[1] For additional information, please read Food factsheet 2 “Local produce”.

3. The main advantages

✓ More flavoursome food.

✓ Higher vitamin and nutritional content.

✓ Lower prices than out of season products.

✓ Usually produced by local farmers. Helps to boost the regional economy and forge social links.

✓ Reduces energy consumption, as transport is not required and greenhouses do not need to be heated.

4. The main disadvantages

× Being restricted to only eating seasonal produce.

Implementation

Phase 1 – Find out about your region's seasonal products

You will find information below about the websites that list seasonal produce for each country / region in Europe. The lists can be downloaded and taken to the supermarket or used when ordering from local farmers.

What to eat now calendar: Eat seasonably

This website contains an interactive calendar enabling you to find out the production months for each fruit and vegetable and also has an interactive map of the **UK**, which can be used to find out where seasonal produce can be bought and which restaurants use it.

Click here to access an Italian calendar showing the fruit and vegetable seasons.

In France, the state has included tips for seasonal produce baskets on its website: Seasonal produce in France. You can also download a short guide to seasonal produce by clicking here.

Click on the following links: a Spanish calendar showing when the different fruits and vegetables are in season, also available in Portuguese.

Links for Scandinavian countries: seasonal products in Sweden and food calendar (in Swedish), Seasonal produce guide (in Finnish) and Recipes using seasonal produce (in Danish)

European member organisations that eat seasonal produce

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that eat 'seasonably' and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

5. Non-Movement organisations involved in this area

Weekly markets are often held in towns around the world. They are a chance to buy fresh produce brought to market by local farmers.

6. Possible partnerships

Just like for local produce, organic food and Fair Trade food, a partnership with local farmers is definitely workable: a weekly or fortnightly delivery of baskets can be enough to satisfy the group's needs.

PUR-  CHASE

3

Buying recycled paper/Tips on how to prevent waste

Introduction

1.5 – three tonnes of wood are needed to produce one tonne of virgin paper. However, around 800kg of recycled paper can be made from one tonne of waste paper, for the same price and quality, but without using so much water or so many chemicals for wood fibre extraction.

There is no set definition of recycled paper, however six European labels do guarantee that 50-100% of wood fibres used for recycled paper are reclaimed, meaning that the amount of virgin fibres is reduced or their use is totally eradicated, thus helping to conserve the raw material.

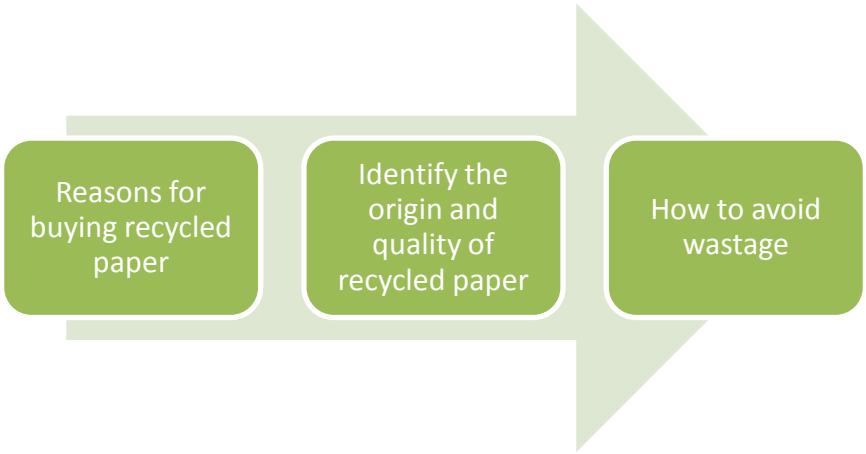
This factsheet contains information about the benefits of using recycled paper and figures that show why it is important to recycle. The factsheet also turns the spotlight on the European labels that guarantee the origin and quality of paper classed as recycled, as well as tips on how to ensure that paper can be recycled.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule



3. The main advantages

✓ Same price as virgin paper.

✓ Stop millions of trees being cut down.

✓ Prevent water pollution caused by the chemical extraction of fibres.

✓ Cut the quantity of waste sent to landfill or for incineration.

✓ Same quality as virgin paper.

4. The main disadvantages

× Recycled paper may become more expensive than traditional paper because of low demand: the price drops as long as demand increases.

Implementation

Phase 1 – Why buy recycled paper? A few statistics

Millions of hectares of forests are cut down every year to meet our paper needs; forests that may not be sustainably managed and whose ecosystems are therefore destroyed.

Globally, 42% of timber is used to make paper and 17% of the wood used comes from virgin forests[1]. The trade affects ancient forests whose biological diversity needs to be preserved for further study. In Europe and elsewhere, papermakers have gradually replaced natural forests with tree plantations based on an industrial production ethos that is threatening local biodiversity.

The production of non-recycled paper[2] :

- Requires large volumes of water to extract fibres: 60l of water per kilo of paper. The production of 100% recycled paper saves around 90% of this water.

- Needs up to 5,000kWh of energy to dry a tonne of paper as opposed to 2,500kWh for a tonne of recycled paper. This means that the production of a single white sheet of A4 paper requires as much energy as a 75W light bulb left on for an hour.

- Emits pollutants such as carbon dioxide, the main anthropic greenhouse gas, and sulphur compounds responsible in particular for acid rain. Recycled paper emits two times less CO2.

- Contaminates the water used with organic materials, especially organochlorides, if chlorine is used to bleach the pulp (increasingly rare procedure). These hazardous substances often cause cancer and remain in the environment and build up in food chains. Chemicals are not used at the pulp production phase of manufacturing recycled paper and their use is significantly reduced at the bleaching stage, when indeed it takes place. Therefore, wastewater's organochloride (and dioxin) content is greatly reduced.

- Inevitably generates large amounts of waste that must be processed: since July 2002, incinerating or disposing of this waste in landfill has been banned. For example, in a typical company, 80kg of paper per person is used every year!

- Two to three tonnes of wood (around 17 trees) are needed to make one tonne of paper. However, 900kg of recycled paper can be made from one tonne of reclaimed paper.

[1] Source: Geneva local government, available on http://etat.geneve.ch/dt/dechets/ecogestes-732-0-8036.html
[2] Source: Notre-planète.info website click here.

Phase 2 – Identify the origin of recycled paper: the European labels

Paper is deemed to be recycled when at least 50% of fibres are reclaimed (paper and cardboard), i.e. come from printed paper waste (post-consumption).

Many paper manufacturers offer 100% recycled paper for weights of 60-350g/m² for all types of printing and publications in a range of colours. Paper waste comes from printed waste (post-consumption). If wood fibre content is less than 100%, the paper is a mix of recycled and virgin fibres, for example: 90/10, 75/25, 60/40 or 50/50.

Paper may or may not be de-inked, bleached and washed with biodegradable soap during the recycling process. The most 'environmentally-friendly' paper is 100% recycled post-consumption paper that is not de-inked or bleached (it has a grey, light beige colour).

However, the recycled paper concept does not offer guarantees about the greenness of the manufacturing and recycling process. Ecolabels certify quality and the low environmental impact of virgin paper, recycling and the usage of recycled paper: the German *Blue Angel* ecolabel, the Nordic *White Swan* ecolabel, the French *NF Environnement* label and the European flower ecolabel. The main features guaranteed by the European ecolabel are:

- Exclusive use of recycled or virgin fibres from sustainably managed forests.
- Energy use during production is limited.
- Reduced sulphur and greenhouse gas emissions into the atmosphere during the production process.
- Reduced water pollution by chlorinated compounds and organic waste during production.

Illustration 1. The German, Nordic, French and European ecolabels

However, the most important thing when buying recycled paper is to look at the exact percentage of recycled fibres. The recycling symbol - a triangle made up of three arrows – shows that the product or packaging contains X percentage of recycled materials[3].

Illustration 2. The recycling symbol, indicating in this case that the product contains 65% recycled material.

Phase 3 – How to prevent waste

More efficient printing

- Correct documents on screen before printing them out.
- Make use of keys and useful software functions: Print Preview to check the formatting, zoom and enlarge to make the document easier to read.
- Only print out if necessary and add a message to your e-signature encouraging recipients to only print out the email if really necessary.
- Print on both sides and also use the 'two pages per sheet' function.

[3] Source: ADEME website (French Environment and Energy Management Agency), click here.

- If your printer allows it, use the blank side of paper that has already been printed for rough drafts.

- Rationalise mailings. Cleansing address files often enables you to delete redundant entries and staff who have left. Mailings can also be sent out by email.

Reuse

- Pages from magazines printed on glossy paper, posters for past events etc can be used as colourful and original wrapping paper.

- Old newspapers can be reused as packaging for fragile items.

Waste and used paper need to be properly sorted so that it can be sent for recycling, if we are to help sustain paper's life cycle.

Refuse to accept junk mail

Place a sticker on your letterbox asking for no junk mail to be delivered. ADEME[3] ran a trial in a district with 200,000 residents. The results showed that with 10% of letterboxes fitted with the *No Junk Mail* sticker[4], the production of 32 tonnes of unaddressed printed paper could be prevented.

5. European member organisations that use recycled paper

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that use recycled paper and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

[4] For more information, go to ADEME's Paris Region website

6. Non-Movement organisations involved in this area

Paper is the number one consumable material used by admin and is a sensitive environmental issue due to its links with combating climate change, deforestation and water pollution.

Within this framework, France's GPEM/DDEN (Public Procurement Contracts Permanent Evaluation Group - Sustainable Development and the Environment)[5] decided to produce a guide to help public procurement officers to incorporate environmental facets when purchasing paper (copying and graphic paper). The guide is available here.

7. Other useful websites

- German Blue Angel ecolabel website (German)
- Nordic White Swan ecolabel website (English)
- PEFC (Promoting sustainable forest management) (multilingual)
- FSC (Forest Stewardship Council) (multilingual).
- Le papier Paper industry news (French)
- WWF guide to sustainably buying paper (English)
- Recycling data from Europe and Spain (Spanish)
- Paper Calculator: quantify the benefits of better paper choices (English)
- How to make a recycled notebook (Spanish)
- How to make a recycled notebook 2 (English)

[5] For more information about this working group and the publication: http://www2.ademe.fr/servlet/getDoc?cid=96&m=3&id=19131&ref=12527&p1=B

Repairing /reusing used goods

Introduction

The consumer society encourages us more than ever before to buy, throw away and buy again; however, nothing stops us from extending the life of goods for a fraction of the cost of replacing them.

Goods have very big carbon footprints[1] because of the large quantities of water, metal and energy used to design, manufacture, transport, use and recycle components and electrical and electronic equipment. Repairing and reusing goods instead of throwing them away or recycling them means adopting the following ethos: using goods / equipment until the end of their service life and then recycling or disposing of them.

In Europe, directive 2002/96/EC of 27 January 2003[2] regulates the management of waste electrical and electronic equipment (the WEEE directive[3]). The directive was amended by directive 2003/108/EC of 8 December 2003 (amending article 9 relating to financing the disposal of WEEE from users other than private households). Repairing and reusing electrical and electronic equipment is a lot more effective way of protecting the environment as it extends their service life. Paradoxically, in France, the WEEE reprocessing industry is funded by the general public (via the so-called *eco-contribution* or *eco-participation* payment). However, equipment manufacturers manage the four accredited eco-companies. It is not in manufacturers' interests to promote repair as secondhand goods then compete with the new goods that they sell.

The directive quoted above applies to practically all the goods that have an impact on the life of an Emmaus group. A list of the 10 product categories:

[1] A carbon footprint is the pressure placed on the natural environment by a human's activities and to satisfy their needs.
[2] Official Journal of the European Union
[3] Waste electrical and electronic equipment.

1. Large domestic appliances.
2. Small domestic appliances.
3. IT and telecommunications equipment.
4. Consumer equipment.
5. Lighting equipment (with the exception of filament bulbs and household lighting appliances).
6. Electrical and electronic tools.
7. Toys, leisure and sports equipment.
8. Medical devices.
9. Monitoring and control instruments.
10. Automatic dispensers.

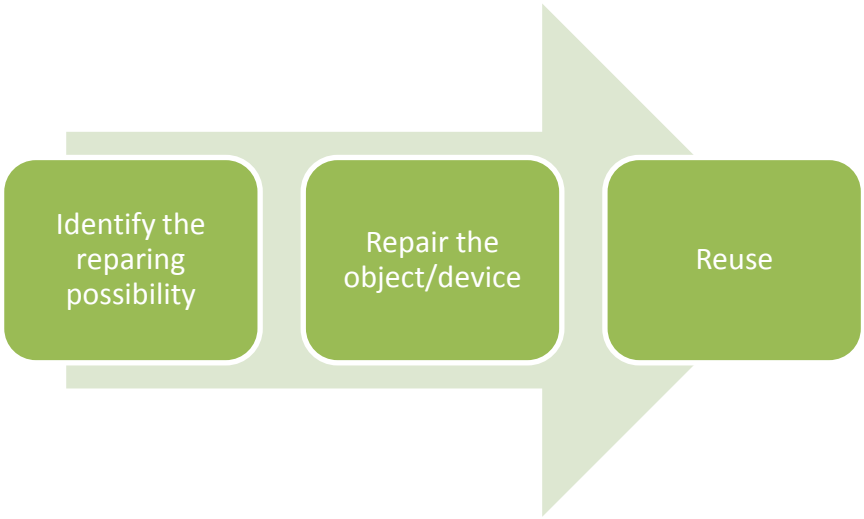
This factsheet concentrates on office equipment: printers, photocopiers and telephones. Please read Waste Factsheet 3 *Reusing Waste* for information about other goods.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule



3. The main advantages

✓ Reduce consumption of natural resources and energy needed to manufacture and transport products which will become waste.

✓ Reduce the amount of waste and limit the pollution caused by waste collection and treatment.

✓ Save money by buying fewer new items.

4. The main disadvantages

× A new appliance may be more energy-efficient.

× Repairing an appliance can sometimes work out more expensive than buying a new one.

Implementation

Phase 1 – Check whether the object can be repaired / repair it

When an item / appliance is showing signs of coming to the end of its service life or when it is malfunctioning, you need to check the source of the problem in order to find out whether it can be repaired.

Consumer goods that can normally be repaired are electronic office equipment such as printers, photocopiers, telephones and computers.

Ideally, someone in the group should assess the problem and do the repair work, otherwise get it repaired by the after-sales service if the device is still under guarantee, or request quotes from repairers.

Phase 2 - Reuse

Reusing means using an item again for the purpose for which it was designed. For example, refillable ink cartridges or using the item for another purpose without altering it (if changes are made, it falls under recycling).

An example of reuse of the appliances mentioned above would be donating them to other non-profit associations or schools that need them but do not have the means to buy them. Components that are still in a good state of repair can be removed and reused in other appliances.

Regarding ink cartridges, which are widely reused: "half are reused (empty cartridges are refilled) or recycled. In order to increase cartridge reuse, **you should buy refillable ink cartridges or reusable and / or reused printer toner cartridges.** 81 million cartridges for printers, photocopiers and faxes are used each year (business and private households), accounting for approximately 19,400 tonnes of waste, of which 2/3 is collected separately." Source: ADEME[4]

The following illustration depicts the difference between recycling and reuse:

[4] ADEME – France's Environment and Energy Management Agency.

Illustration 1 Recycling materials

Illustration 2 Reusing wooden pallets

5. European member organisations that repair and reuse

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that repair and reuse and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

In France, the Greater Nancy Urban Area provides residents with a directory that lists over 300 reuse organisations in the local area in order to encourage repair and reuse. Items can get a new lease of life and be used in a different way, instead of becoming waste, just by taking a few simple steps.

The directory was put together in partnership with the Chamber of Commerce and Industry, the Meurthe-et-Moselle Chamber of Trades and Crafts and the Greater Nancy local districts, and is regularly updated in order to make it more relevant.

The directory is available here.

7. Other useful websites

Video: How to fill an ink cartridge (French)

Dismantling and repairing: how to dismantle and repair Smartphones, printers and computers (French).

Article: How to link freeware to sustainable development and / or the social and solidarity economy? (French)

How to repair printers and other household appliances (Spanish).

How to service a printer (Spanish)

How to refill and reuse a printer cartridge (English).

Reducing and reusing WEEE (English)

EU directive on WEEE (available in five languages).

4

WASTE

Sorting waste

Introduction

Sorting waste involves separating and recovering waste at source depending on its type in order to prevent contamination and the devaluation of component materials.

Sorting waste gives waste a new lease of life, most often via reuse[1] and recycling, preventing it from coming to the end of its life cycle in landfill or being incinerated, which in turn reduces its carbon footprint[2], otherwise waste sorting at the very least enables end-of-life cycle waste to be disposed of correctly. In addition, the sorted waste can be sold and can therefore be an additional source of income for the group.

At Emmaus, sorting is already being done in communities with shops. It is important that donations are properly sorted in order to put good products on sale and to prevent products from being thrown away where at all possible. Why not capitalise on the habit of sorting - which is already an intrinsic part of Emmaus' daily life – and start sorting your group's waste?

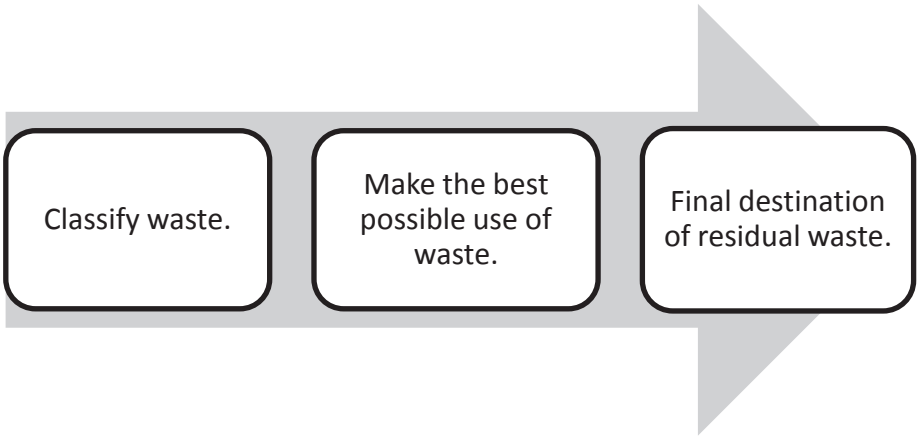
Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

[1] Please read Waste Factsheet 3 (Reusing Waste) for more information.
[2] A carbon footprint is the pressure placed on the natural environment by humankind. The tool is used to calculate the area needed by a population to meet its resource usage and waste requirements.

2. **Schedule**



3. **The main advantages**

✓ Sorting is a source of income, as waste can be reused and recycled.

✓ It can also boost employment via professional inclusion schemes run in the groups.

✓ It helps conserve natural resources due to a drop in demand for the raw materials needed to make new goods.

4. **The main disadvantages**

× Knowing which types of waste can be reused: the people who sort waste need to be trained.

Implementation

Waste classification and final destination: is it recyclable, organic or hazardous?

Waste classification varies from region to region. It is important to get in touch with the organisations responsible for local waste management in order to find out the system being used in your area. Generally, waste is classified according to type or its physical, chemical and / or biological characteristics. Other classifications may exist for the regulatory framework covering final waste. It is vital that you check the situation in your area.

The following section provides a general classification of the most common waste found in the Emmaus groups:

1. Recyclable waste (building materials, paper, cardboard, metals, plastics, WEEE): these materials can be reused in other areas. Depending on the region, you may be able to dispose of all this waste in a single bin (recycling bin) or in different bins for paper / cardboard, packaging and glass, for example.

Illustration 1 Plastic bottles and containers and metal cans and packaging

.

Illustration 2 Paper, cardboard and food cartons

Do not include crockery, cutlery, caps and stoppers, mirrors, batteries etc.

Illustration 3 Glass pots, jars and bottles

Do not include foil used in the kitchen.

Illustration 4 Tins, cans, metal boxes and scrap metal

2. Biodegradable or compostable waste[3] (Green waste, sewage sludge, food waste etc) which can be absorbed directly into the biomass. This waste is naturally and quickly destroyed, generally by bacteria or chemical reactions, and the products of the decomposition process are identical to natural products. They can be reused by different sectors (composting, bio-energy, bio-fuels, fertilisers etc).

[3] Please read Waste Factsheet 4 (Composting) for more information.

Illustration 5 – Decomposable waste

3. Hazardous waste Items / substances that may harm the environment and human health: batteries, paint, solvents, pesticides, medicines – all these types of waste should not be thrown into normal dustbins, instead a special procedure is used because of their hazardous nature.

   Packaging generally contains information about the hazardous nature of products. Words such as *corrosive, irritant, explosive* and *inflammable* are used on their packaging along with the respective symbols.

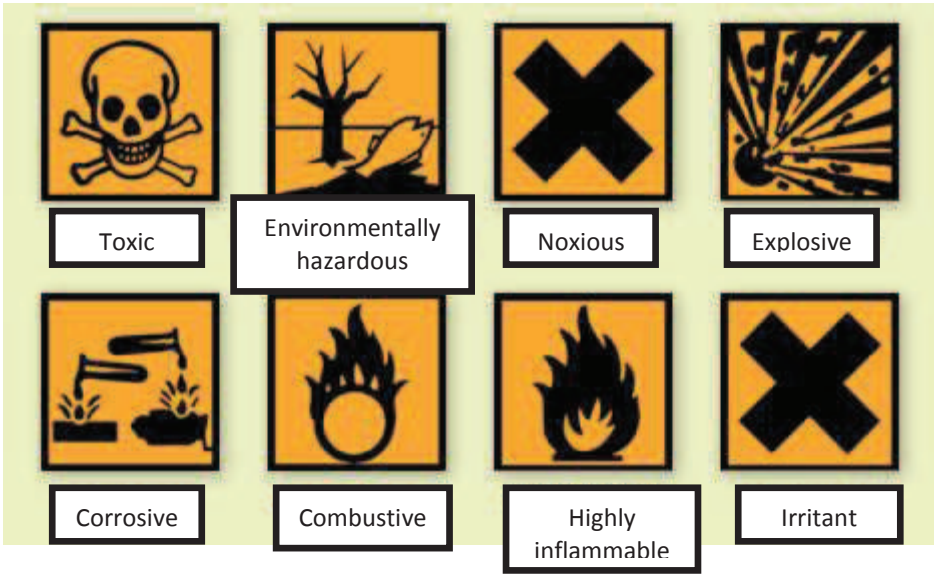
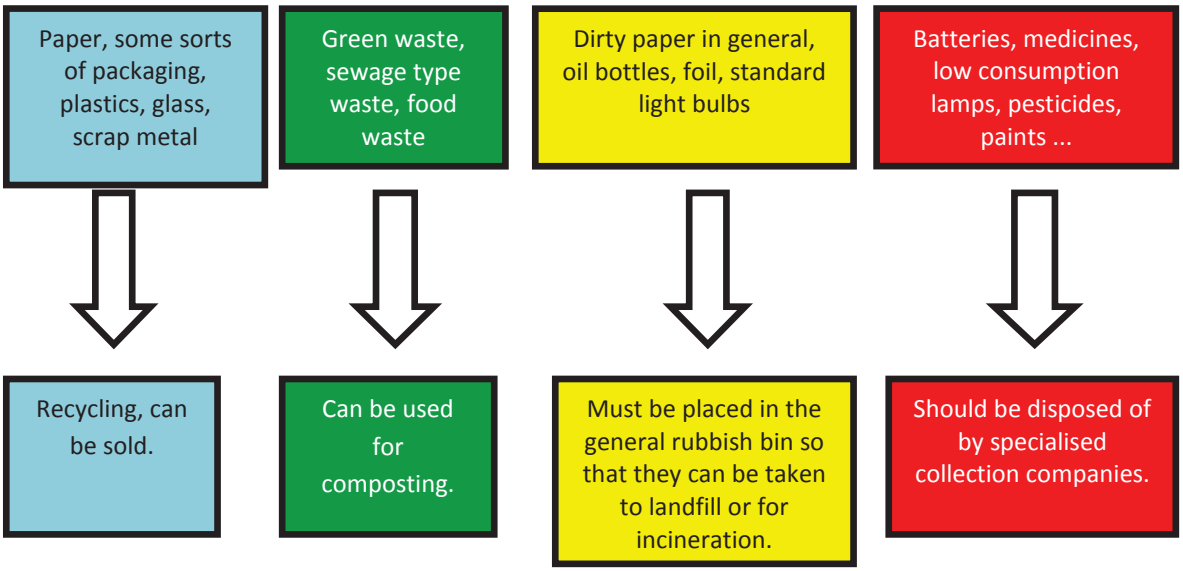


Illustration 5 Examples of hazard symbols

Summary



A special approach for hazardous waste - Where should it be taken?

Table 1 Hazardous waste collection points

Waste type	Collection point
Batteries, storage batteries, energy-saving light bulbs.	Collection bins provided by sellers and retailers
Products containing pesticides, fungicides and herbicides, mercury-based thermometers, car batteries and waste oil, solvent-based paints, dirty materials.	Waste reception centre.
Medicines and X-rays.	Chemists

5. European member organisations that sort waste

Almost all the groups in Europe sort waste and indeed waste sorting is one of Emmaus' main activities.

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that reuse waste or restore goods and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Waste sorting is proving to be a very important activity at all levels of society. Local councils are responsible for it and environmentally-aware citizens and organisations sort their waste.

For example, the civil construction industry is working with educational establishments to research viable ways of reusing industry waste, as it currently produces a large amount of waste that is not reused.

If you click here, you will be able to watch a video (in French[4]) showing how concrete is recycled and demonstrating the importance of sorting in this process.

7. Other useful websites

- ✓ ADEME guide to hazardous waste for eco-friendly citizens (French)
- ✓ Récyclum, an eco-organisation working to eradicate used light bulbs (French)
- ✓ Concrete recycling organisation (English)
- ✓ Making use of the energy contained in waste: example from Sweden of the importance of careful waste sorting (English)
- ✓ Waste management in Spain: an action plan showing all the stages of the process (Spanish)
- ✓ The importance of sorting waste (Spanish)

[4] More information on this topic is available in the *Useful websites* section.

Living without plastic

Introduction

A plastic material or plastic is a mixture containing a base material (a polymer) which can be moulded and shaped, generally when heated and under pressure, in order to make a semi-finished product or an object. Plastic is in high demand because of its versatility. However, its carbon footprint, from production to final usage, is notorious. Indeed, the very qualities that make it resistant and durable also prove problematic, as if plastic is discarded in the environment, it will take around 450 years to decompose.

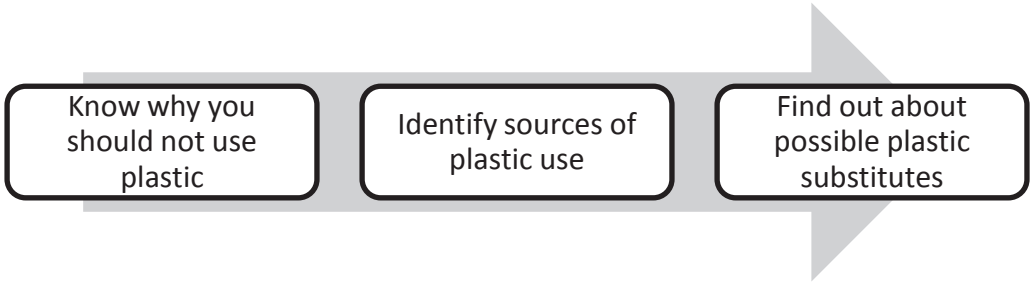
This factsheet contains tips and information about using plastic and its impact on the environment and tells you how to avoid and substitute it.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule



3. The main advantages

✓ Reduce the amount of waste sent to landfill or incinerated.

✓ Help to progressively decontaminate the environment as plastic takes over 400 years to decompose.

4. The main disadvantages

× As plastic is light, it has a much better resistance x weight ratio[1] than wood or paper, which are potential substitutes.

× Plastic production is highly viable as it is a very flexible material, which reduces production and energy costs (can be moulded at low temperatures).

Implementation

Phase one – Know why you should not use plastic

The main environmental impacts of plastic usage over its life cycle are listed below.

1. Plastic production phase

Plastic is produced from a range of raw materials: cellulose, coal, natural gas and particularly oil, which is a major source of greenhouse gases and is also running out. "*The production process also involves energy being consumed and additional resources being used up. Emissions may be released into the water, air or soil during the production process. Emissions that are a cause for concern include heavy metals, chlorofluorocarbons, polycyclic aromatic hydrocarbons, volatile organic compounds, sulphur dioxides and dusts. These emissions thin out the ozone layer, can cause causer, smog and acid rain etc. Consequently,*

[1] A light material that can bear a greater load than other materials has a good resistance / weight ratio.

the production of a plastic product can have a harmful effect on ecosystems, human health and the physical environment."[2]

2. Usage / waste phase

It is now virtually impossible to find products that do not use plastic in their packaging, especially products sold in individual portions. Apart from food, one of the main global sources of plastic is the use of plastic bags for shopping in shopping centres and even more so in supermarkets. Even if these bags are used more than once, normally as rubbish bags in the bin, this uncontrolled usage means that plastic is constantly building up in the environment. In addition, a failure to properly manage local waste can lead to more serious consequences. The following photographs illustrate the impact that plastic can have:

Illustration 1 A 15 year old turtle that has had a plastic ring stuck around its shell since it was small.

[2] Source: T.J. O'Neill, Life cycle assessment and environmental impact of plastic products.

Illustration 2 A bird found dead on the Midway Islands, one of the world's most remote islands

As plastic is created by humankind but is not a natural part of the environment, its presence seriously upsets ecosystems all around the world. The following section provides an in-depth look at the effect that plastic has on the environment.

Floating plastic becomes marine waste which kills protected and threatened species, even in areas a long way from the coast. Plastic bags eaten by turtles, which confuse them with jellyfish, are one such example. Another problem is large numbers of albatross dying because their gizzards and stomachs are full of dozens of toys and plastic objects that they have swallowed at sea or that their parents brought to the nest. The parents bring these items to their chicks as if they were food, but unlike the bones and fishbones swallowed by birds, they cannot be dissolved by any animal's gastric juices nor can they be expelled from the stomachs of chicks or adults, meaning that they eventually die. Large numbers of albatross chicks therefore die of starvation having sometimes swallowed dozens of plastic objects (stoppers, bits of pens, gadgets and other children's toys, container debris etc).

According to a study published in 2011 by the San Diego Institution of Oceanography (California), in 2009 one in ten fish in the Northern Pacific were found to have

ingested plastic and fish living in the middle depths were swallowing approximately 24,000t/year[3].

Apart from the environmental impact, a large amount of plastic is used to produce plastic bottles, which can also present a human health problem. Bottles are used to store several kinds of drink and can be reused, however this is not recommended, as contamination can occur because of the bacteria that build up inside bottles.

Phase 2 – Where do we use plastic? How can we replace it?

Identifying sources of plastic use is important as it helps us to find out how we can then substitute it. The following list details the most common uses and possible substitutes:

1. Plastic shopping bags: Use a fabric bag or a reusable bag. Cardboard boxes are also a good alternative.

Illustration 3 Reusable and recycled bags

[3] Geneviève De Lacour, 9*% de plastique dans le poisson du Pacifique*, short article published in the *Journal de l'environnement*, 4 July 2011. Link: http://www.journaldelenvironnement.net/article/du-plastique-dans-9-des-poissons-du-pacifique,23961

2. Plastic bags in the Emmaus shops: Reusing bags used to donate goods is already a common practice as it means that groups do not need to distribute new plastic bags and that they do not throw away the ones they receive. Encourage customers to get into the habit of bringing their own bags.

3. Plastic bin bags: Supermarket carrier bags that are reused as bin bags can be replaced by bags made from old newspapers.

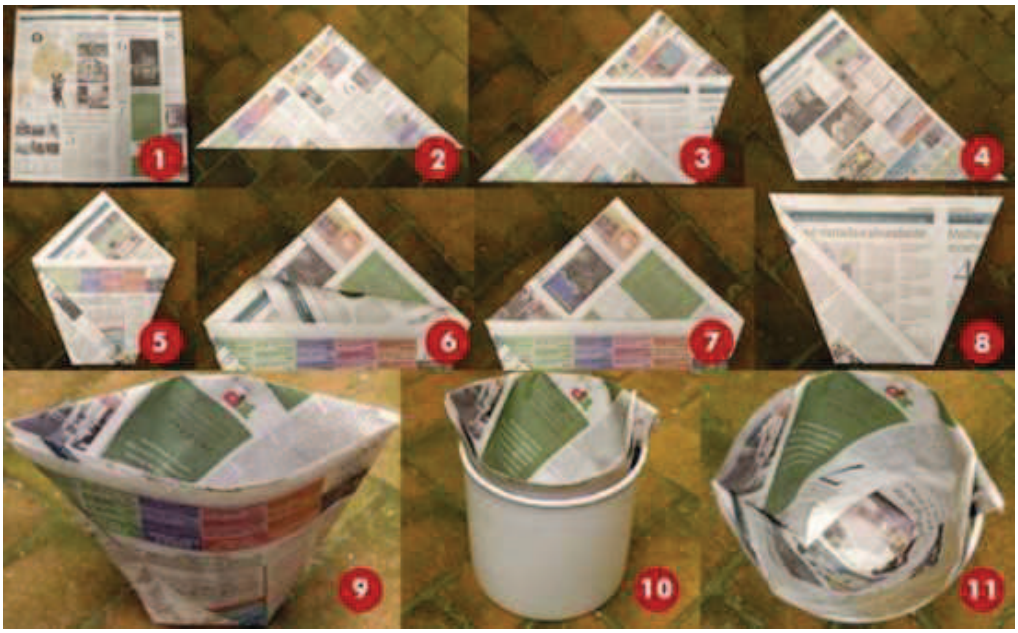


Illustration 4 Rubbish bag made from newspaper

4. Shopping: Try to buy food sold in portions as little as possible, as this type of food uses a lot of plastic to divide up the portions. Fruit and vegetables sold loose: there is no need to place each one in a separate bag, the label bearing weight and price information can be stuck on the fruit / vegetable itself.

5. Plastic bottles: Drink tap water or avoid small bottles for juice, soft drinks etc. The same principle as for food sold in portions applies here.

5. European member organisations that try to live without plastic

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups trying to live without plastic and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Since the supermarkets started doing away with plastic bags, the general public has started to become aware of the importance of not using them. People are becoming increasingly aware of their role in protecting and conserving the environment.

7. Other useful websites

- ✓ Good plastic sorter game (French)
- ✓ 51 ways of reducing plastic usage (English)
- ✓ Video: replacing plastic bags (Spanish)

Reusing and repairing waste

Introduction

Repairing and giving a new lease of life to objects that are heading for the bin is Emmaus' core activity. Today, it is vital that goods are more sustainably used in order to combat the consumer society's liking for the ephemeral. The aim is to give a new lease of life and not throw away items that can still be used. The word 'restoration' is heavily used in this factsheet as this practice is closely linked to reuse.

Over the following pages, you will learn about the main types of waste that can be reused, how it can be reused and examples from inside and outside the Emmaus Movement.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺☺

2. Schedule

3. The main advantages

✓ Recycle unsellable or unused items, leading to a drop in the amount of waste sent for incineration or to landfill.

✓ Sell original designs at a more affordable price.

✓ Enable companions to be creative and gain skills.

✓ Offer experience and train people who are reintegrating society.

4. The main disadvantages

× Requires space and investment in materials for the designs.

Implementation

Phase 1 – Sort materials

The first phase of the reuse process involves sorting the materials that arrive, separating those that are unfit for direct use from those that have potential. It is recommended that a qualified person manages this work[1]. Various materials and items can be reused. In this factsheet, particular attention is paid to textiles and furniture because these items are easier to restore and reuse than electrical and electronic equipment and consumer goods[2].

Phase 2 – Techniques and options available for reuse

Workshops: When starting to do restoration work, it is recommended that the group runs workshops to raise the awareness and then train those involved (companions,

[1] See the link with point 7 – Possible partnerships.
[2] For more information on these two topics, please read Water factsheet 3 *Water-saving dishwashers and washing machines* and Purchasing consumer goods Factsheet 2 *Repairing and reusing used goods.*

volunteers and / or people on inclusion schemes) about techniques and ways of producing quality products. This type of vocational training transfers knowledge to participants who can then apply it to their designs and subsequently deliver training themselves to others interested in the work.

The workshop can be supervised by a person specialising in design, homeware, sewing or other restoration related trades. There is a need to assess the time taken – sale price ratio. Such an assessment enables the activity to be rationalised, people to be aware about the need for an economic assessment and a framework to be put in place.

Furniture

Furniture can be reused by repainting it, restoring the whole piece or replacing parts that are broken or in a poor state of repair. The following photos are of a restored wardrobe.

Illustration 1 Wardrobe before and after restoration

Clothes: Clothes can be reused by mending small flaws as soon as the garment arrives, by customising outdated garments or by using the fabric to make other original items. Photographs of a few examples of clothes reuse:

Illustration 2 Handbag made from a pair of jeans

Illustration 3 T-shirt customisation: before and after

Other items: There are lots of items that can be reused instead of simply throwing them away. If you are creative, various materials can be reused instead of letting them become waste. The main materials used are tetrapack® packaging, plastic bottles, plastics in general, small used items that can be used as homeware etc. The following examples may well inspire and make you want to start reusing straightaway:

Illustration 4 Light fitting made from plastic bottle tops

Illustration 5 Chairs made from plastic waste

Illustration 6 Storage made from tetrapack® packaging

Phase 3 – Use in the house or put on sale

The new items that you produce can be used by the group or put on sale in the shop. As they are unique and exclusive items, they have added value and can also be exhibited on a special occasion or put aside for a big sale, for example. For clothing, a big fashion show can be arranged to showcase the designs to the general public, with Emmaus groups in Europe putting on such shows.

If the group does not have a shop, you can look for shops that would be willing to sell the items.

5. European member organisations that reuse

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that reuse waste or restore goods and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

Groups such as Emmaus Haguenau and Emmaus Marseille (Pointe-Rouge) have got into design, as the following photos show:

Illustration 7 The Emmaus Haguenau fashion show in 2011

Illustration 8 Upcycled items produced by Emmaus Point Rouge, Marseille, France.

6. Non-Movement organisations involved in this area

Several interior designers and fashion designers have already presented collections made from reused waste. An example is the Japanese designer Jum Nakao's paper couture collection presented at Sao Paulo Fashion Week in 2004.

Illustration 9 Jum Nakao's 2004 collection

The following items were produced by an Italian-Brazilian designer who uses scrap metal to create lights and other homeware items:

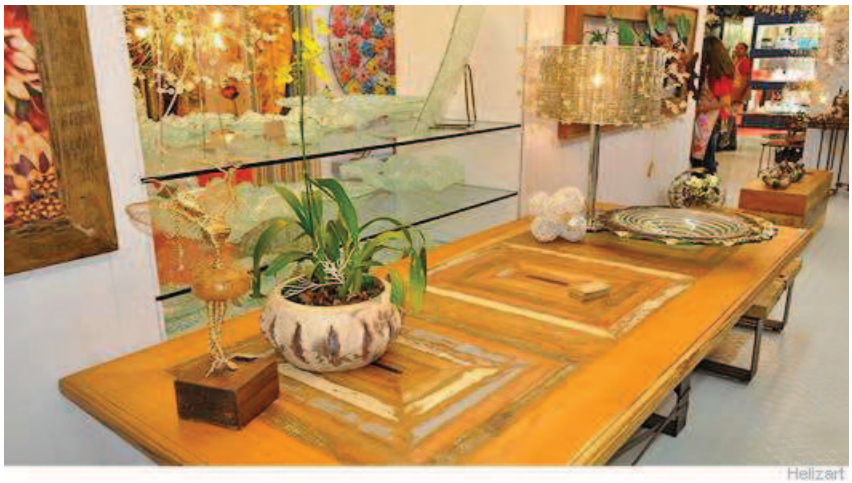


Illustration 10 Scrap metal upcycled to produce homeware

7. Possible partnerships

Some Emmaus groups work in partnership with local designers who support the workshops so that those staffing them learn to reinterpret items and learn about restoration techniques.

Another partnership option would be to search for institutions that deliver design, interior design or fashion design courses to see if there are training programmes or projects that could be rolled out at Emmaus and that would meet the needs of the group.

8. Other useful websites

- ✓ Video: Restoring an old piece of furniture (French)
- ✓ Techniques and tips for restoring furniture (French)
- ✓ 19 ways to reuse denim (English)
- ✓ WRAP (funded by the four governments of the UK and the EU): support for recycling and for cutting waste (English)
- ✓ ObjectiBis blogs (reuse ideas) (Spanish)
- ✓ Emmaus Fundación Social website, zero waste line of bags: inclusion organisation that reuses materials (Spanish)

Compost

Introduction

According to ADEME[1], the waste produced by residents of big cities has almost doubled over the past 25 years. Each urban dweller now produces around 390kg of waste per year. It is hard to grasp the sheer scale of the waste generated because local councils manage our domestic waste. However, the amount of waste needs to be reduced and composting in one of the ways of doing this.

"*Composting can be defined as a controlled biological process that recycles and turns organic matter (biomass sub-products, biological organic waste etc) into a stabilised and hygienic end product, compost, which is packed with humic compounds.*"[2]

Composting is an alternative way of properly disposing of several kinds of waste: food scraps, garden waste, dry toilet waste (if applicable), thus enabling the amount of household waste collected by the council, waste transport and the areas needed for landfill, in addition to incineration, to be reduced. The practice also generates quality fertiliser which improves the soil of gardens and vegetable patches as it enhances fertilisation and humus content. Other plus points include: save money on buying fertilisers and the environmental benefit of not having to use them, as fertilisers contain chemicals.

This factsheet contains tips and the easy steps that you need to follow to make quality compost.

[1] ADEME: France's Environment and Energy Management Agency.
[2] A definition is available in French on Techno-science.net.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺☺

2. Schedule

3. The main advantages

✓ Proper disposal of waste.

✓ Reduce the amount of household waste to be disposed of in landfill or for incineration.

✓ Obtain fertiliser that is free of chemicals and is packed with organic matter for use in your garden or on your vegetable patch.

✓ Save money on buying fertilisers.

4. The main disadvantages

× Can be restrictive in terms of having to wait for compost to be made and in terms of the quantity of each type of waste that can be used: making compost is a meticulous business.

Implementation

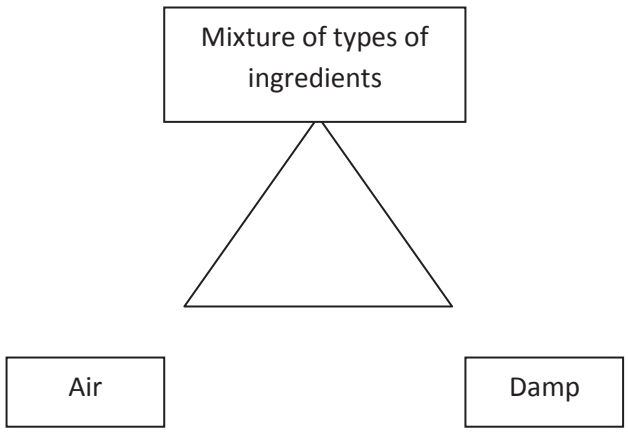
Several composting techniques exist. This factsheet presents the simplest techniques which can be applied at two levels: small and large quantity of waste for decomposition, in a container (composter) or directly on the soil (in a heap).

Phase 1 - Find out about the composting process

Composting is an aerobic process that is basically done in two stages by living micro-organisms that digest the organic matter. The different phases of the process:

- Phase one (thermophilic): fungus, bacteria, protozoa and other living organisms that more slowly carry out the decomposition of the cellulose and lignin get to work.
- Phase two (maturing / stabilising): The humic acids start to synthesis and the process stabilises leading to humus being produced.

The requirements of micro-organisms (see below) must be balanced in order for the processes to correctly take place:



- Balanced mix: A mix of carbon rich ingredients (brown, hard and dry) and nitrogen rich ingredients (green, soft and moist).

For browns, you can use branch shavings, dead leaves, straw (it is recommended that you store these ingredients so that you always have them to hand in order to mix them with greens). For nitrogen rich ingredients or greens: plant waste, gardening waste (hedge clippings, grass cuttings etc), green leaves, perishable household waste (fruit and vegetable waste), egg shells and nut shells. The specialists do not agree on whether coffee grounds can be composted, so it is best to add them in moderation, along with cheese and bread. **Fish, meat and fat should not be composted under any circumstances.**

You can also compost paper (excluding printed paper), cardboard, 100% natural fabrics (wool and cotton), biodegradable litter used by herbivores, and household waste such as tissues, kitchen roll, wood ash, sawdust and wood shavings.

Illustration 1 Garden waste: carbon rich browns.

Illustration 2 Cooking waste: nitrogen rich greens.

- Damp: Comes from nitrogen rich ingredients (which are moist).
- Air: Provided by the structuring carbon rich ingredients (hard).

Phase 2 – Preparing the compost heap and for the compost process

You can compost in a plastic or wooden composting bin for small quantities and directly on the soil for bigger quantities. However, fermenting compost needs to be covered in order to protect it from excessive rainfall or from being dried out by the wind and sun.

Illustration 3

Left: Front-opening plastic compost bin

Right: Side-opening compost bin.

Illustration 4

Left: Wooden compost bin

Right: A rainwater collection tank being reused for composting.

Illustration 5

A compost heap built directly on the ground

- Mixing types of ingredients:

You should alternate layers of approximately 5cm of greens and browns to encourage aeration and ensure that compost is homogenous, and you should always finish by placing a layer of moist browns on top. The following diagram shows how the mix should be layered.

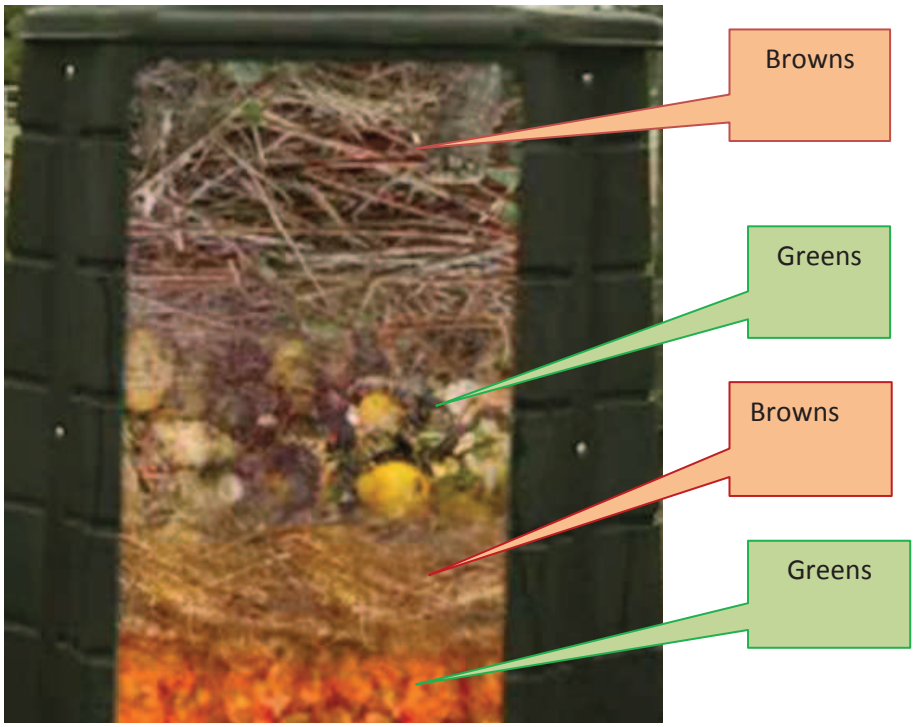


Illustration 6

Correct layering of browns and greens

- Upkeep
  - Regularly turn the heap.
  - Place it in the shade.
  - Cover it when there is heavy rain.
  - Dampen it when it becomes too dry.

- Potential problems
  - Too damp: Remove all the excess water and air the heap so that it dries out.

This is vital, as composting is an aerobic process. It is estimated that air should take up at

least 50% of the compost bin's volume. Anaerobiosis occurs when the oxygen rate in the container is below 10% and it takes over when oxygen falls below 5% (air = 21%O_2).

Illustration 7

Overly damp compost

- Too dry: Dampen the compost and put it back inside. The micro-organisms are unable to assimilate the nutrients that are made soluble and conveyed by water if the heap is not moist.

Illustration 8

Overly dry compost

- Too many greens: Composting does not take place as there must be a balance between carbon and nitrogen rich waste (the carbon acts as energy so that the nitrogen can be assimilated), so brown waste needs to be added, or vice versa.

Illustration 9

Too much green waste

Illustration 10

Compost is well decomposed after three months but is not yet fit for use

Phase 3 – Knowing when compost is ready

"Good compost is a product whose organic components have biologically turned into less aggressive and more stable substances. The decomposition processes do however continue at a slower rate once the fermentation phase comes to an end. You therefore need to know when and for what purpose compost can be used, in order to avoid the risk of phytotoxicity.

Fresh compost, i.e. compost that is starting to ferment (after approximately two weeks); can be used for mulching or on mushroom beds. Once fermentation is complete, compost is stable and can be used as an organic fertiliser / soil amendment. If compost is to be used as a growing medium, it needs to have undergone a long maturing period (especially if the plants are sensitive: seedlings, lettuce etc).”[3]Compost is ready for usage in the garden or the vegetable patch after six months.

Illustration 3 How the composting process evolves

Once the compost has 'matured', it can be taken out of the bin and applied directly to the chosen spot. Any branches that have not yet decomposed should be left in the bin to complete their decomposition process.

5. European member organisations that compost

Emmaus Europe website’s Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify

[3] Source: http://www.techno-science.net/?onglet=glossaire&definition=1079

European groups that compost and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Since 1998, the Qualiagro programme[4] has been comparing the impact of different types of soil amendments: compost made from household waste, household bio-waste, sludge mixed with green waste, and cattle manure.

Erosion, decline in organic matter, soil contamination, salinisation, soil compaction, decline in soil biodiversity, soil sealing, floods and landslides: the European Commission's *Towards a strategy for soil protection* Communication has identified eight threats to Europe's soils (listed above). The impact is not just environmental. Soil damage is thought to cost the Member States close to €38 billion a year, according to the European Environmental Bureau (EEB[5]).

One of the possible ways of combating some of these impacts is spreading compost. The full article about this research project can be found here.

7. Other useful websites

- ✓ ADEME's step by step video guide to making compost (French)
- ✓ Full article from *Actu environnement:* Using compost to combat soil erosion (French)
- ✓ Guide to home composting (English)
- ✓ Composting tips (English)
- ✓ Composting guide (Spanish)
- ✓ Practical guide to composting (Spanish)

[4] Qualiagro: research programme conducted in partnership by INRA (French National Institute for Agricultural Research).
[5] European Environmental Bureau: http://www.eeb.org/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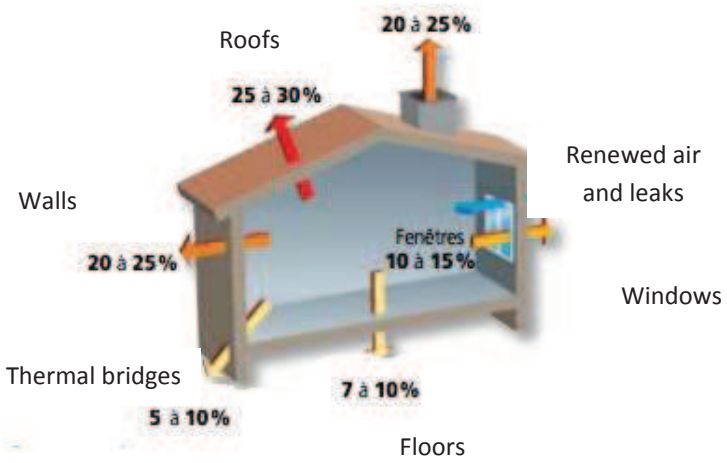
Insulation

Introduction

Guaranteeing a comfortable temperature, saving energy and money, while helping to protect the environment, are the advantages of thermally insulating a building.

A poorly insulated building can waste a lot of energy. See the following example (values may vary):



Steps can be taken to prevent energy loss during the construction process or when renovating a building. Techniques vary and can be adapted to individual needs and budgets. However, it is important to prepare properly before fitting insulation. For example, before insulating a damp wall, you need to find out what is causing the damp and get it treated. It is also vital to select damp-resistant insulation materials.

Some materials used for insulation reduce the porosity of walls. For example, polystyrene is waterproof and prevents the water vapour contained in the atmosphere from being transferred and therefore increases the risk of condensation. Rooms therefore need to be fitted with a general and permanent ventilation system. Poor ventilation alone causes

significant energy loss. An effective ventilation system needs to be installed to overcome the problem, as the system will regulate air flow depending on requirements, while limiting energy loss.

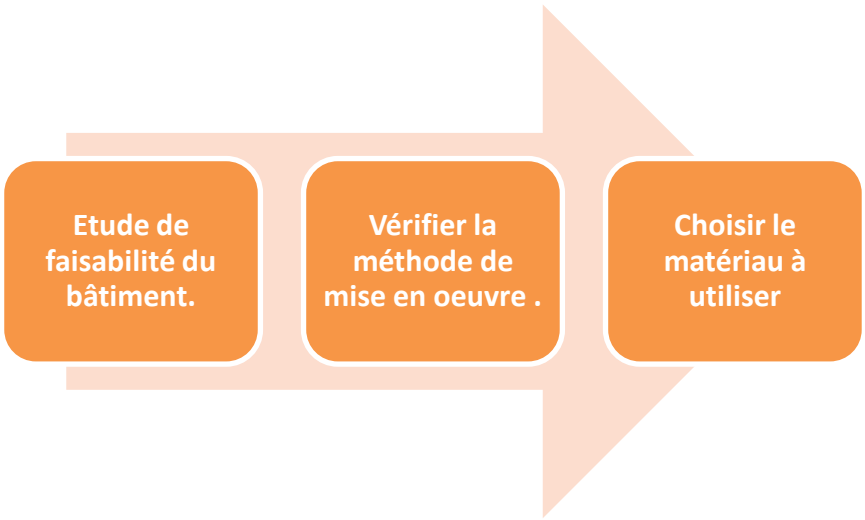
This factsheet contains information and tips about these practices.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺

2. Schedule



3. The main advantages

✓ Enjoy a comfortable heated environment.

✓ Save energy and therefore help to protect the environment.

✓ Reduce damp and maintenance costs.

✓ Increase the value of your property.

4. The main disadvantages

× Your chosen insulation may not always be feasible for all types of building and a technical opinion needs to be obtained before it is installed.

× Can be relatively expensive to implement.

Implementation

Phase 1 – Building feasibility study

The type of insulation depends on several factors:

- Building age: If the building already exists, it is more energy-efficient to fit external thermal insulation (ETI). However, in the case of a new build, it is advisable to fit insulation during the construction process.
- Identify where energy is being lost: Insulation should target typical energy loss zones (roofs, walls, woodwork and floors) and thermal bridges[1].
- Budget available: You can choose the level of insulation that is going to be installed. The type of insulation may also depend on the budget, with external insulation being more expensive than internal insulation, for example.
- Local climate: Requirements depend on climatic factors such as local humidity and temperature intensity in summer and winter.

[1] Thermal bridges are heat 'leaks' that lead to significant energy loss through the junctions between flooring and external walls, chimneys, ventilation systems and even letterboxes!

It is important to obtain the opinion of one or more technical experts. Preliminary work is sometimes required before insulation can be installed. For example, if the walls are showing signs of damp, you must first discover the cause and sort out the problem before insulating.

Phase 2 - Choosing the right technique - ETI, ITI and self-insulation

Three main techniques are in existence. Each of them is recommended for certain buildings and requires a different budget.

1. External thermal insulation (ETI)

The technique involves creating an insulating envelope around the building to create a continuous barrier and limit thermal bridges. External insulation is considered to be the most effective form of insulation in terms of energy saved but is also the most expensive.

2. Internal thermal insulation (ITI)

This technique involves fitting the insulating material onto the inside face of the wall. Internal insulation is then covered by a lining or partition (plasterboard) to maintain it. This technique is recommended for buildings that are going to be built or if external insulation is not possible.

3. Self-insulation

Self-insulation is recommended for new builds. It enables the same materials to be used for construction and insulation and therefore saves money. However, it is not the most effective method.

The following table compares the main advantages of each technique and lists the types of building for which they are recommended and the estimated cost of each one.

	ETI	ITI	SELF INSULATION
Recommended for	Existing buildings and if you want to change the building's façade.	New builds or buildings whose facades cannot be changed.	Buildings that are going to be built.
Advantages	▪ Reduces thermal bridges. ▪ Increases wall thermal inertia (reinforces their envelope capacity). ▪ Protects the façade from the effects of the wind, water and condensation. ▪ Does not reduce living space. ▪ Does not alter the woodwork. ▪ No need to move out of rooms that need insulating. ▪ Does not require maintenance or major repairs. Does not move pipework. ▪ Modernises the façade.	▪ Evens out internal wall unevenness. ▪ Enables pipework or other cabling to be concealed behind the layer without damaging the insulating material. ▪ Preserves the façade. ▪ Gets around some restrictive planning regulations (jutting out onto public thoroughfares, historic site etc)	▪ Saves time when installing. ▪ Makes it easier to install woodwork. ▪ Eradicates thermal bridges. ▪ Makes for a considerably more comfortable heated environment.
Cost	The most expensive technique	Mid-range price compared with the other techniques.	The cheapest technique.

Phase 3 – Choosing your insulation material

"A good thermal insulator is a material that does not conduct heat. Air (dry and static) is considered to be the best insulator. Therefore, the aim of insulation is to trap air in different ways (fibre fabric, plastic bubbles etc) in order to reduce its heat conduction capacity as much as possible.[2]" Two characteristics help us to assess the quality of an insulation material:

1. Thermal conductivity coefficient (λ): The lower the λ, the more the material insulates. Insulating materials normally have a thermal conductivity coefficient of between 0.035 and 0.050.
2. Thermal resistance (R): Thermal resistance is a material's ability to slow down the flow of energy going through it. It is expressed in m².K/W and is calculated using the thickness (in metres) – thermal conductivity (λ) ratio of the material in question. This figure is high when a material is thick and its conductivity coefficient is low. For a given thickness, the greater the R, the more insulating the wall.

This information is presented on a label certifying all the declared general characteristics, performance, the CE mark and certification.

The CE logo on product labels certifies product compliance with directive 89/106/EC[3] relating to construction products and authorises its sale in the European market.

[2] Source: http://www.gdfsuez-dolcevita.fr/portailClients/ShowProperty?nodePath=/BEA%20Repository/Racine%20Gaz%20de%20France/Documents/fiches_produits/7.pdf//Fichier

[3] This directive states that all construction products must meet six essential requirements that are applicable to constructions: mechanical resistance and stability, fire safety, usage safety, acoustics, health and safety,

Apart from the CE logo, ACERMI certifies products in France (Association for the Quality Certification of Thermal Insulation Materials).[4] This certification also guarantees that the product meets EU standards.

An example of a label and the information it contains.

Illustration 1 An insulating products label

The main thermal insulation material families are as follows:

1. Synthetic materials (extruded and expanded polystyrene, polyurethane, polyester): Expanded polystyrene is the main synthetic insulator used. It has an open pore

environment, **heat insulation** and energy saving. Find out more: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0106:fr:NOT

4. Find out more:
   - In English: http://www.acermi.com/rt/acermi_rt070211_anglais.pdf
   - In French: http://www.acermi.com/rt/acermi_rt070211.pdf

structure, whereas extruded polystyrene has a closed pore structure, meaning that it better resists compression. Polystyrene emits toxic gases contained in its fireproof additives when it comes into contact with heat, so care must be taken when using it.

Illustration 2 Expanded polystyrene

2. Mineral, plant and animal fibres: (rock wool and fibreglass are very widely used, as are sheep's wool, hemp, linen and wood wool). Mineral fibre based insulators are the most widely used. During the winter months, they offer the same insulation capacity, however the lightest ones do not provide heat protection during the summer. Their insulation capacity drops significantly when they come into contact with damp (which is why rolls are protected by vapour barriers).

Illustration 3 Rock wool

3. Renewable materials (e.g. cellulose): Cellulose is generally made from recycled newspapers. Inoffensive additives (boric salt) protect it from fire, insects and mould.

Illustration 4 Insulation material made from newspapers

Self-insulating blocks, used for both construction and insulation, also exist. They are less energy efficient; however they are more cost and time efficient when constructing a building. The most widely used blocks are cellular concrete, terracotta monoblock and hemp concrete blocks.

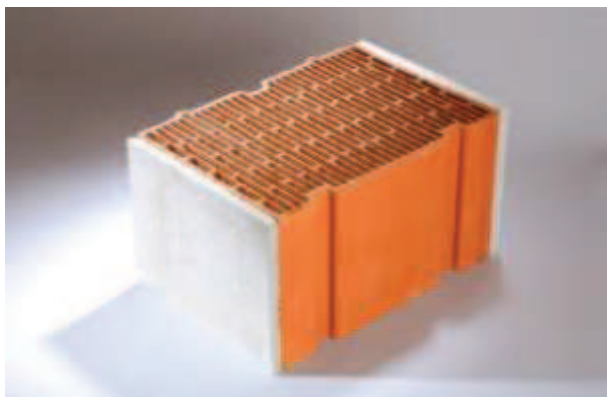


Illustration 5 A terracotta monoblock

The following table compares the main insulation materials.

Table 1 Comparison of the standard characteristics of insulation materials.

	Heat insulation performance level	Noise insulation performance level	Advantages	Disadvantages	Price	Where applicable
Mineral wools: glass and rock wool	Very good	Very good	Best value for money	Unpleasant to handle. Not recommended for damp environments.	€3–5 m² for thickness of 100m.	Everywhere: roofs, roof spaces, floors, floating slabs, walls.
Synthetic: extruded and expanded polystyrene, polyurethane.	Very good	Ok for polystyrene	Thin	Not as long-lasting	€5/m²	Floors, walls, habitable roof spaces, roof terraces.
Natural wools: hemp, linen, duck	Very good	Poor	Lasts well	Expensive	€15 / m²	Walls, roof spaces and roofs
Cork	Very good	Average / poor	Excellent durability, environmentally-friendly and does not lose its shape.	Expensive	€7-30 / m² depending on the required thickness	Everywhere

5. European member organisations with insulation

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups with a heat insulation system and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Building energy efficiency is a worldwide requirement and is now mandatory for new builds in the European Union. In addition, a comfortable environment whether it is hot or cold outside benefits everyone.

There are examples to be found everywhere, in both public and private buildings: installing a thermal insulation system is important for all levels of society, as it saves money, offers greater wellbeing and is environmentally-friendly.

7. Other useful websites

- ✓ Building regulations (French): http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=15027
- ✓ ADEME/ How to choose an effective insulator (French) http://ecocitoyens.ademe.fr/mon-habitation/construire/isolation/choisir-un-bon-isolant
- ✓ Comparative thermal insulation advice (English) http://insulation.quotatis.co.uk/insulation-cost
- ✓ Free insulation in the UK (English): http://www.freeinsulation.co.uk/
- ✓ Article: Eco-friendly home insulation (Spanish): http://www.ecomarc.es/
- ✓ Thermal insulation website (Spanish): http://www.aislamientos.ws/termico/

Reclaimed materials

Introduction

Reclaimed materials can be used in a house in several different ways and at several levels. Consequently, this factsheet will focus on using these materials in building construction and renovation.

Reclaimed materials can now be used in building in many different ways. Technological developments and a constant concern for the environment have meant that engineers, scientists and ordinary citizens have discovered ways of using reclaimed materials, such as tyres, bottles and even concrete, in construction.

Apart from generating less waste, such as construction debris, this strategy reduces the cost of building work.

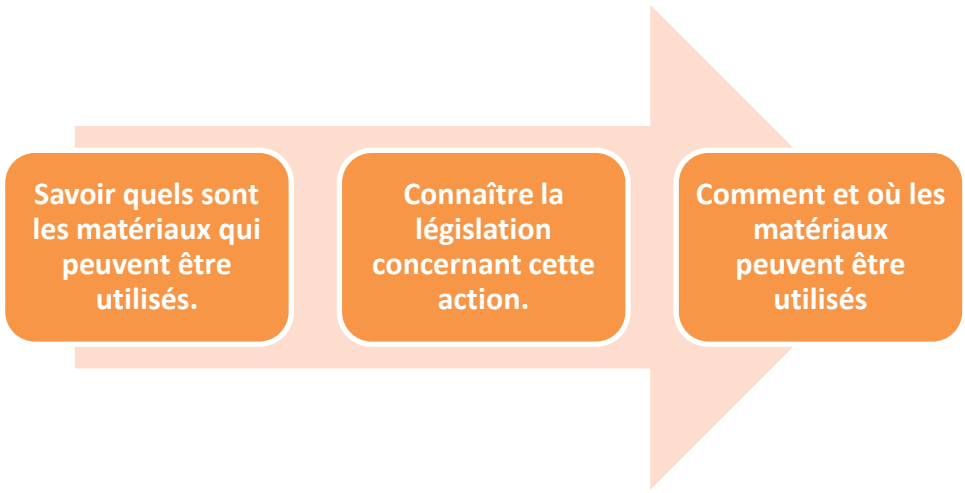
Materials that can be used and the legislation governing the materials are dealt with in this factsheet.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺☺

2. Schedule



3. The main advantages

✓ Reduces costs, as new building materials do not need to be bought.

✓ Environmentally-friendly, as reusing materials stops them from being sent to landfill or for incineration.

4. The main disadvantages

× Need to have the right quantity of the relevant material.

Implementation

Phase 1 – Find out which materials are the best for building

Individual creativity is important in this area. However, some types of materials have already been used for construction and we therefore know how they respond to the demands of a building project. These materials are:

1. Concrete: Concrete is the most widely used material in the world after water. A significant amount of concrete is also currently wasted. As already mentioned in Waste Factsheet 1 *Waste Sorting,* concrete waste can be reused, as is done in some countries such as Denmark and the Netherlands, where recycled concrete aggregates are included in the new concrete production process. In other countries, such as France, reuse is limited to roadworks, due to legislation, which will be explained further on in the factsheet.

2. Metal: Some types of metal are very malleable, which makes them easy to recycle and enables them to be reused in civil engineering in a whole range of ways.

3. Plastic bottles: Research is being done on how to construct walls from blocks of recycled plastic bottles. This use of plastic prevents fine and thick sand from being used. However, this concept is just at the research stage at the present time.

4. Paper: Newspaper is used to make thermal insulation materials[1]. It is a well-developed technique that is proven to be effective.

5. Wood: Wooden pallets can be used if they do not contain chemicals (normally used in woodwork – doors and windows – and in furniture in general).

Phase 2 – Find out about the legislation in force

Legislation covering the use of certain materials does exist. This is the case for concrete, for example. In Switzerland, Scandinavia, the Netherlands and Great Britain, the use of concrete is quite widespread. In these countries, recycled concrete aggregates can be mixed in with new concrete, while the practice remains limited in France, where the aggregates can only be used for roadworks.

Treated or dirty wood is regarded as hazardous waste, depending on its hazardous substance content. It has to be collected and treated in the same way as the waste that has soiled it (e.g. solvents and paint). There are no usage constraints covering pallets and other types of wood that have not been treated with these chemical substances.

[1] Refer to Housing Factsheet 1 *Insulation* for more information.

As these are new techniques, there is no hard-and-fast answer to the question of whether such materials can be used; especially the most 'alternative' reclaimed materials, such as tyres. It is recommended that you always obtain the opinion of an industry professional, such as an architect or engineer. Paying a visit to the local council to obtain information from the relevant department is another easy way of finding out whether a material can be used.

Phase 3 – How and where can these materials be used?

1. Concrete: Concrete can be ground and incorporated into new concrete or used for roadworks. Concrete waste needs to pass several quality tests, in accordance with current legislation, in order to be deemed fit for purpose.
2. Metal: Metal, in its different forms, can be used in foundations and in infrastructure in general, as it does not lose its original characteristics.
3. Plastic bottles: Research is underway to find out whether plastic bottles can be used for construction, and PET[2] in particular are being studied in order to prove that they offer sufficient quality for building. They would be used in building walls, either as the sole material, or would be ground into a mix with other materials.
4. Paper: Paper has already carved out a niche in the heat insulation market.
5. Wood: Wood that is free of chemicals can be used to make wooden items such as doors and windows and in construction infrastructure. The list of recommended websites at the end of the factsheet includes examples of buildings built with reclaimed wooden pallets.

5. European member organisations that use reclaimed materials

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify

[2] PET: stands for polyethylene terephthalate or PETE, and is a themoplastic polyester type plastic, as opposed to thermosetting polyesters. In simple terms, PET can be defined as refined oil.

European groups that use reclaimed materials and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

A website has published examples of houses built from reclaimed materials[3]:

Illustration 1 Buddhist temple made from glass bott

[3] Address: http://webecoist.momtastic.com/2010/03/29/10-surprising-reclaimed-recycled-building-materials/

Illustration 2 Tyres being used to build a house

7. Other useful websites

- ✓ Article about recycling construction materials (French)
- ✓ Example of timber houses (French)
- ✓ Sustainable building materials (Spanish)
- ✓ 30 eco-buildings constructed using 10 reclaimed materials (Spanish)
- ✓ Recycled content in construction products (English)
- ✓ A guide to incorporating recycled materials into construction projects (English)

Orienting a building to capture maximum sunlight

Introduction

A well-oriented building takes advantage of sunshine and helps to reduce energy bills. The direction in which a plot faces affects the layout and organisation of the building.

When constructing a building or renovating, the idea of changing its orientation to capitalize on sunshine in order to improve its energy efficiency can be considered.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule

There is no schedule for this initiative. It is simply a case of orienting the building in the right direction.

3. The main advantages

✓ Saves energy, as the building will take advantage of natural light and the sun's warmth.

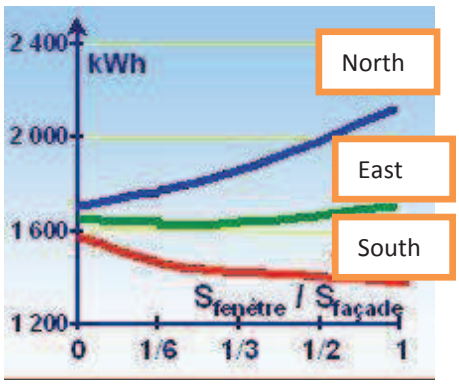
✓ Heat from the sun's rays: the sun's rays are accompanied by heat. The additional heat is very pleasant in winter but can be uncomfortable in summer due to overheating.

4. The main disadvantages

× If the building is constructed in urban areas the orientation is difficult if there are other buildings around the desired locale.

Implementation - The concepts behind the technique

To passively capitalize on sunshine, the building needs to be south-facing because the sun shines from the south all year round. The south-facing façade therefore needs to have extensive glass areas. East-West facing buildings are never desirable. Too many windows on the west-facing side lead to overheating in summer. Windows can be incorporated on the east side if morning mists are not a problem in the area. These windows will provide light and heat in the morning. Finally, north-facing buildings are never desirable and openings on this side must be minimised. The following diagram compares the energy use resulting from the different orientations.



Window / Facade

"A significant decrease in heating requirements can be seen for south-facing buildings, while they rise for a north-facing building. This usage pattern is only valid in

certain cases and depends on numerous factors, such as the type of glazing, wall insulation, inertia etc. The gap that progressively opens between the curves reflects the heat balance of windows: they capture sunshine when south-facing and leak heat when north-facing."[1]

The following diagram lists the main arguments in favour of correct building orientation.

The rooms are never exposed to direct sunlight. An insulated aluminium window fitted with enhanced insulation double glazing enables the width of the window to be increased in order to make the room lighter, while using the equivalent amount of energy.

Overheating occurs in the evening at the hottest moment of the day. External sun protection is vital. It is also recommended that bedrooms are not located on this side of the house.

Very sunny in the morning. This is an advantage in autumn, winter and spring but proves to be a disadvantage in summer. External sun protection, such as shutters, can be used to easily overcome this problem.

In winter, the sun is low and the windows capture maximum sunshine and heat. This orientation is ideal for picture windows, large windows and sliding doors. A canopy blind, awning or an overhanging roof are the solution in the summer. As the sun is a lot higher in the sky, it no longer penetrates the house. The devices provide sufficient shade without affecting light.

Maximum sunlight

[1] Source: http://www-energie2.arch.ucl.ac.be/transfert%20de%20chaleur/3.7.2.htm

5. European member organisations with buildings oriented to capture maximum sunlight

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups with buildings oriented to capture maximum sunlight and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Orienting a building to capture maximum sunlight is recommended for those who want to build a house and for businesses and schools that are planning to construct buildings. The technique enables significant energy savings to be made and makes for a comfortable thermal environment.

Green roofs

Introduction

The green roof concept has been in existence for a long time. Green roofs are also referred to as eco-roofs, living roofs and vegetated roofs and involve covering a flat or slightly sloped roof with a green substrate.

Green roofs offer several benefits, with some of the main advantages being thermal comfort, energy savings and the roof playing a part in the water cycle.

Green roof maintenance and additional construction costs are relatively low. The technique is fully developed and is relatively simple to implement. It does not alter the building's structure. Indeed, green roofs offer better stability and watertightness than standard flat roofs.

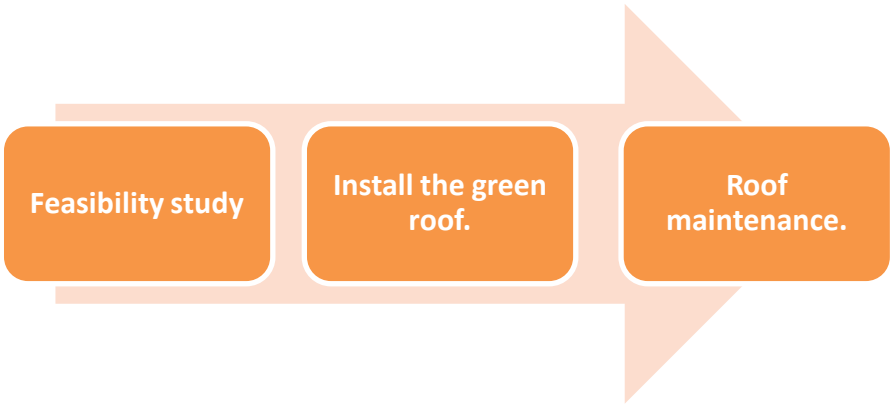
This factsheet provides green roof tips and information about which plants to choose, among other information.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺☺

2. Schedule



3. The main advantages

✓ The evapotranspiration caused by green roofs increases air humidity and helps to fix dust and pollen suspended in the air. Lead and carbon particles and particulate matter are absorbed into the substrate or nourish the bacteria, plants and inspects that develop in it. Living roofs therefore help to improve urban air quality.

✓ The reconstruction of an ecological network and green corridors, which permit plant and animal species to move around urban environments, and enable the flow of genes needed for species to survive and adapt to the environment.

✓ Green roofs make for more comfortable buildings, as they considerably reduce temperatures inside buildings and in urban areas in general.

✓ Positive impact on the water cycle and quality: Green roofs allow more rainwater to infiltrate, because unlike the sealing caused by the usage of concrete and asphalted road surfaces, for example, plants absorb and filter rainwater (which contains heavy metals, among other substances). This infiltration also reduces the quantity of water that goes into the sewer system and consequently the cost of treating wastewater.

✓ A living roof is thermally inert making for significant energy savings.

✓ Improves the way the urban environment looks: urban environments are normally grey and industrial.

4. The main disadvantages

× Having to adapt the roof of existing buildings (roof access, for example).

Implementation

Phase 1 – Find out whether a green roof can be installed

Green roofs are easy to install, however a number of factors do need to be taken into account:

1. The roof must be flat or only slightly pitched (normally < 30°); otherwise it is a green wall.
2. The capacity of the roof's structure needs to be considered: it must be strong enough to withstand the weight of all the plants and soil when dry and waterlogged.
3. The roof must be easy to access so that it can be maintained.
4. Plan the design of the green roof: i.e. weigh up irrigation and drainage systems and look into the plants and soil or tub composition.
5. Obtain a building permit: *"As green roofs are part of the building, they fall under the scope of the building industry. Specific regulations exist in countries where the technique has been developed. In Germany, for example, there are "directives covering greening roofs" which bring together the information needed for green roof design, installation and maintenance. France does not have any green roof specific legislation."*[1]

Phase 2 – Implementation

1. Choose the type of green roof Two main types of green roof exist.

The following table lists the main features, advantages and disadvantages of each type.

[1] Source: http://www.actu-environnement.com/ae/dossiers/vegetalisation_toiture/reglementation_toit_vegetalise.php4

	Advantages	Disadvantages
Extensive green roofs Thin layer of soil, little or no irrigation required, low plant yield.	✓ Light, meaning that the roof does not usually need reinforcing. ✓ Suitable for large spaces. ✓ Suitable for roofs with a 0-30^{0} pitch. ✓ No need for an irrigation or drainage system. ✓ Little technical expertise required. ✓ Relatively cheap. ✓ Natural look.	X Limited choice of plants. ×X Cannot be used for recreational purposes. Does not look good, especially in winter.
Intensive green roofs Deeper substrates, requires an irrigation system and plant favourable conditions.	✓ Enable several varieties of plants and habitats to be introduced. ✓ Good insulator. ✓ Can be used just like normal land, with ponds being created, bird houses installed and even fruit and vegetable gardens being planted. ✓ Suitable for recreational use. ✓ Can look attractive.	✓ Adds more weight to the roof. ✓ Requires an irrigation and drainage system (needs more energy, water, materials etc) ✓ Costs more. ✓ More complex system and more expertise required.

2. <u>Installation of a load-bearing structure</u> The structure can be made of concrete, steel or wood and must withstand the weight of the planned design, which can double and even triple when waterlogged by rainfall or a build-up of snow melting.

3. Installation of waterproofing A root barrier and a waterproof membrane separate the living roof system from the insulated building below. The waterproof membrane prevents leaks and is essential because it protects the building. The insulating layer must withstand compression and plant roots.

Illustration 1 Installation of waterproofing

4. Irrigation and drainage system A draining layer may be installed depending on the roof's pitch, the resistance of the load-bearing structure and the depth and type of substrate. Crinkled polyethylene is used most frequently to create a drainage space around 10mm high that will direct the rainwater to the roof drain or to external gutters. To prevent soil / substrate particles from clogging it up, a non-woven geotextile filter can be attached to it, which retains fine soil particles and lets the water filter away[2] .
5. Installation of a growing medium Substrates are used as the plant growing medium. They offer soil type characteristics (pH and water retention). Choice of substrate is based on plant type and the roof's load-bearing capacity. Different types of substrate exist: natural minerals (sand, gravel, lava, clay), artificial minerals (perlite) and recycled materials (bricks and crushed concrete). Light materials are the most widely used, as they do not overload the roof and are suitable for most plants.

[2] Geotextiles are usually made from synthetic fabrics and are used in the building industry, for civil engineering and farming. They are synthetic fabrics which may or may not be woven and allow water to filter.

6. Planting Technically, all plants can grow on roofs but some need constant care to protect them from relentless sunshine, frost and strong winds. In most cases, vegetation will be **herbaceous or shrubs.** They will be selected based on the region's climate, sunshine, roof slope, substrate depth and depending on the individual's possibilities (see the above table).

Illustration 2 A growing substrate and plant layer

Green Roofs
Structure and functions

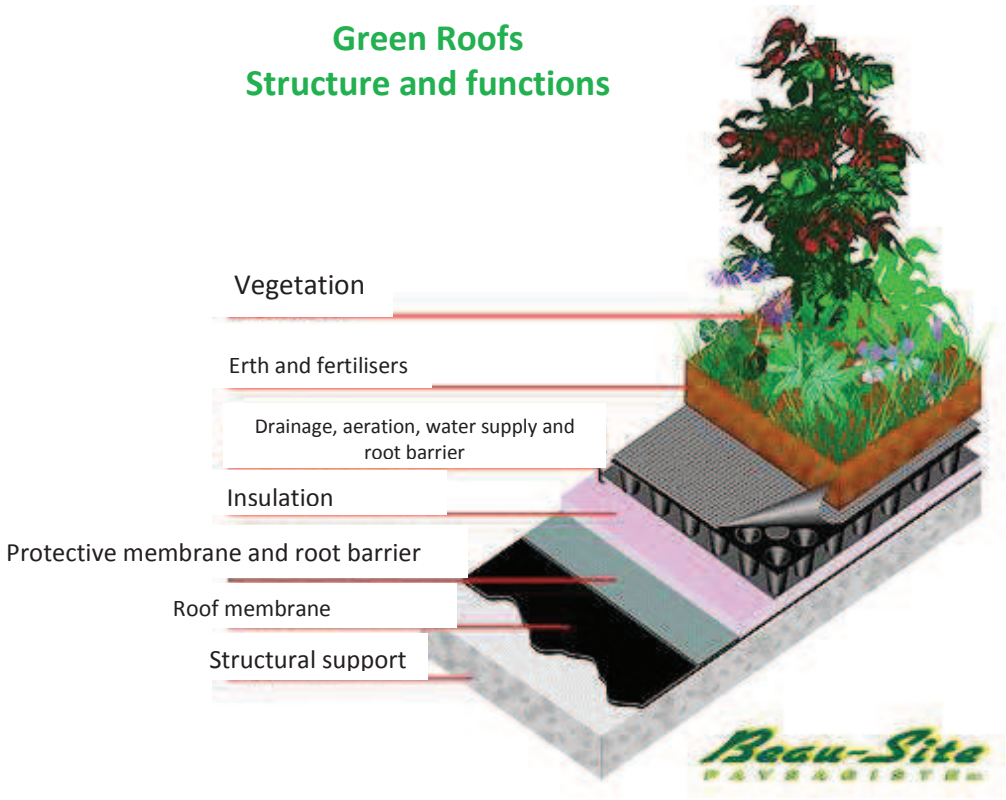


Illustration 3 Cutaway view of a green roof

Phase 3 – Green roof maintenance

The following should be done during the first year: weeding, checking the seedlings, and watering if necessary. Extensive green roof maintenance is less onerous. Extensive roofs need one to three visits a year in order to ensure that sterile zones are cleared, to do weeding and to check that rainwater is running off properly and that the plants are developing.

5. European member organisations with green roofs

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that have green roofs and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Private sector institutions, schools and public buildings have green roofs because of the numerous advantages listed at the start of the factsheet. A green roof makes a major contribution to the quest for high energy efficiency, particularly because of the temperature stability that the technology provides.

7. Other useful websites

- ✓ The Green Roof Centre (English)
- ✓ List of plants for a green roof (English)
- ✓ List of plants for a green roof (Spanish)
- ✓ Article: examples of buildings with green roofs (Spanish)
- ✓ Map of France to help select the right substrate (French)
- ✓ A stage-by-stage guide to creating a green roof (French)

6 ENER-GY

Energy-saving light bulbs

Introduction

As part of the quest to make a building highly energy efficient, using energy-saving light bulbs (known as fluorescent lamps and as CFLs - compact fluorescent lamps) helps to save energy and has a positive environmental impact.

The energy efficiency of fluorescent lamps is due to mercury. The amount of mercury used in them has been reduced by 90% over the past 25 years. While mercury is potentially hazardous to the environment in the case of dozens of millions of light bulbs coming to the end of their lifespan every year, breaking a single light bulb does not constitute a major health risk.

As part of its drive to reinforce energy efficiency requirements, the European Union has sought to encourage the use of energy-saving light bulbs, which must totally replace standard light bulbs by December 2016[1].

The following products are affected by the changes resulting from this European directive[2]:

[1] Energy Efficiency Action Plan: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2012:169E:0066:0080:FR:PDF

[2] Directive number: http://europa.eu/legislation_summaries/energy/energy_efficiency/l27057_en.htm

Table 1 Products that will be affected by the European Directive

Phase	Date	The following light bulbs will no longer be sold*
1	1/9/2009	Frosted light bulbs (apart from energy efficiency class A CFLs) and clear 80W and over bulbs*.
2	1/09/2010	Clear 65W plus incandescent bulbs*
3	1/09/2011	Clear 45W plus incandescent bulbs*
4	1/09/2012	Clear 7W plus incandescent bulbs*
5	1/09/2013	Quality criteria to be raised
6	1/09/2016	Energy class C bulbs

***Apart from energy efficiency classes A, B and C.**

****Source:** http://www.magelec.com/Information-relative-au-retrait.html#nb1

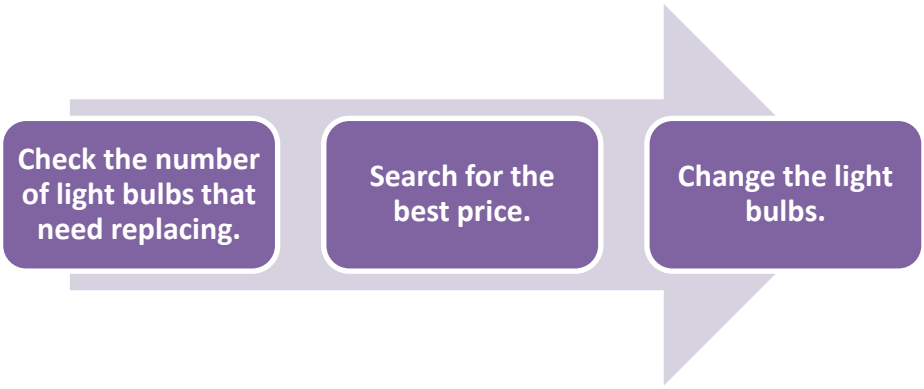
This factsheet contains tips and information so that you can start to switch over to energy-saving light bulbs, which will become mandatory across Europe in the near future.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule



3. The main advantages

✓ Direct energy and financial savings (up to 80% less energy used).

✓ Indirectly saves the resources needed to produce energy – helps care for the environment.

✓ Long-lasting (life expectancy around 10 times longer than incandescent bulbs), which enables the number of units produced for the same service life to be limited and therefore considerably reduces the volume of waste produced.

The following table compares standard light bulbs and energy-saving bulbs:

Table 2 Cost – benefit comparison of the two types of bulb

	Incandescent 100W light bulb	20W Compact fluorescent lamp (CFL)
Average retail price	0,5€	5€
Lifespan	1,000 hours	5,000 hours
Cost of using for 5,000 hours (including the retail price)	€59	€16

*Source: http://www.consommerdurable.com/2009/09/comment-choisir-une-ampoule-economie-energie-fluocompacte/

4. The main disadvantages

× Energy-saving light bulbs initially cost more than standard bulbs. However, they provide value for money because of their extended lifespan and low energy consumption.

Implementation

Phase 1: Information you need when choosing an energy-saving light bulb

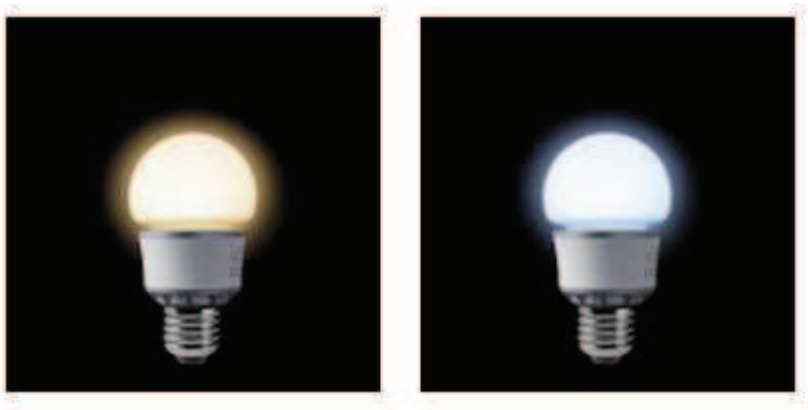
Having checked the number of bulbs needed by the group, it's time to choose the replacement bulb. Here are some technical specifications which may help when making your decision (apart from energy efficiency and lifespan).

1. Number of times the light bulb can be switched on and off

This information is particularly important for CFLs. Standard CFLs (3,000 – 6,000 on/off cycles) should not be fitted in lights that are turned on and off frequently (on average over three times a day), such as in bathrooms or corridors fitted with movement detectors, as it is likely to shorten their lifespan. However, there are CFLs that can withstand up to one million on/off cycles and are totally suited to this type of usage. There are also light bulbs that remain unaffected by the number of times they are switched on and off (incandescent halogen bulbs, for example).

2. Colour of the light (colour temperature)

While incandescent bulbs always provide the same light colour ("warm white"), compact fluorescent lamps and LEDs offer a wider range of colour temperatures. This is an important aspect when choosing a light bulb. A 2,700 Kelvin light bulb (warm white) is ideal for relaxing. Above 4,000 Kelvin (cold white), the light bulb is better suited to a work area. The following photographs illustrate the difference in colour.



3. Operating temperature

Compact fluorescent lamps and LED lamps are more temperature sensitive than incandescent halogen bulbs. It is important to choose a bulb which will work well at the temperatures to which it is likely to be exposed. For outdoor lights in climatic zones with cold winters, it is for example advisable to select a lamp that works when it is freezing outside, otherwise its light output may be reduced on winter nights.

Illustration 1 Label showing the operating temperature of a light bulb

4. Light bulb dimensions

If you want to fit a new type of light bulb, do not forget to check that it is suited to your light fitting before buying it.

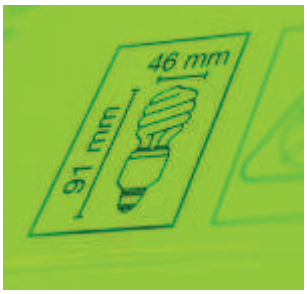


Illustration 2 Light bulb size

Phase 2: How to exchange a light bulb or obtain a refund if the bulb proves to be faulty

CFLs are generally guaranteed. It is best to retain proof of purchase (till receipt, invoice and packaging) so that you can exchange the bulb or ask for a refund, in line with the guarantee, if the bulb proves to be faulty.

Phase 3: How to dispose of compact fluorescent lamps and light emitting diode lamps

These lamps contain complex electronics and should not be placed in the normal household waste. This is indicated by the crossed-out bin logo on the packaging. They should be returned to one of the shops selling them or placed in any other dedicated collection system for waste electronic equipment.

5. European member organisations that use energy-saving light bulbs

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that already use energy-saving light bulbs and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

The entire population and the private and public sector have started to purchase this type of bulb because of the energy savings they offer, the changes planned by the European Directive (listed at the start of the factsheet) and because of the fact that old style light bulbs are being phased out.

7. Other useful websites

- ✓ Guide to selecting the right light bulb: EU website (multilingual)

Green energy suppliers

Introduction

Following the telecommunications sector, it was the turn of the energy sector and specifically the electricity market to open up to competition. Consumers have had the right to switch supplier – and therefore change the type of energy they consume – for the past few years[1].

In some cases, it is simply not possible or too complicated to develop a source of renewable energy in a group. There are a number of suppliers offering renewable energy in the market. However, there is a need for caution, as 'green' electricity is not always as green as suppliers claim, as sources of energy are combined and these sources are sometimes not renewable. You therefore need to find out more about the prospective supplier.

European directive 2009/28/EC[2] establishes a common framework for the use of energy from renewable sources in order to limit greenhouse gas emissions and promote cleaner transport. It is always best to contact local government in order to obtain more in-depth information about this subject. This factsheet contains general information about European legislation.

Practical information

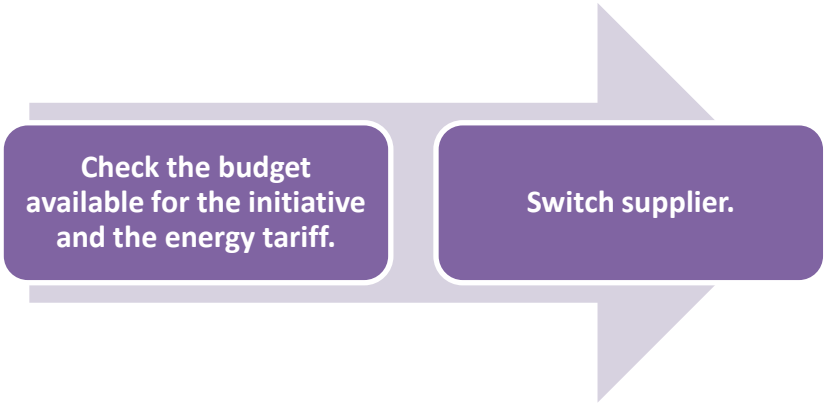
1. Factors

[1] Fuel is also regarded as a source of renewable energy. However, as the Emmaus groups do not sell fuel, this factsheet will focus on energy that is directly consumed, such as electricity.

[2] Link: http://europa.eu/legislation_summaries/energy/renewable_energy/en0009_fr.htm

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺☺
Budget	☺☺

2. Schedule



3. The main advantages

✓ Help to preserve limited natural resources.

✓ Reduces polluting emissions, particularly greenhouse gases.

4. The main disadvantages

× This type of energy is sometimes more expensive.

× It can be difficult to find a supplier as the market is relatively new.

× There are some contradictions regarding the 'renewable credibility' of certain sources, for example energy produced in hydroelectric plants, which destroy extensive green areas during their construction.

Implementation

Directive 2001/77/EC sets the energy policy framework for the different countries of the European Union. In order to provide consumers that opt for green electricity with a guarantee that all or part of the electricity they consume is produced using these clean technologies, since 2003 European regulations have made it mandatory for Member States to prove the renewable origin of the electricity consumed. Several traceability and certification schemes currently co-exist, however there is a need to be aware of each scheme's actual requirements, as they do not have the same electricity source and functioning requirements.

Phase 1: How to choose a green energy supplier

Several factors need to be analysed when choosing a green energy supplier. Here are the main ones:

EECS®(European Energy Certificate System) certificates

The EESC® is a harmonised European certification and traceability standard for renewable energy. The association brings together over 180 members from 19 European countries: power producers who certify that a given volume of their electricity comes from renewable sources, green certificate traders in Europe and end consumers.

A green certification system certifies that a certain amount of green electricity has been fed into the grid. Certificates come in the form of an electronic file containing a unique ID number, the date the electricity was produced, the name of the body issuing the certificate, the electricity production unit, its power, the technology used and information about any public funding. A certificate is valid for three months from its date of issue. It is destroyed immediately after use. Spot checks billed by the national bodies are made at producers' premises in order to check whether they are actually generating the energy that they claim to produce. The body also charges producers sign-up fees and commission on the certificates that are issued and transferred.

A producer with green certificates can sell them on to a purchaser (electricity trader, private individual etc) who will then be able to prove that they use green energy in return for paying an additional amount that appears on their bill and covers the purchase of the certificate. A certificate is equivalent to a megawatt hour (MWh). Its monetary value fluctuates depending on wholesale electricity market prices and direct negotiations.

Despite enjoying international recognition, this certificates system is disputed by several environmental conversation organisations. They criticise the fact that the system is dissociated from the production and sale of renewable electricity. It does not encourage the production of clean energy because it only involves suppliers that purchase certificates reinvesting some of their profits in these technologies.

In 2007, these organisations set up an independent European green electricity labelling scheme in France.

The Eugene label

The scheme is known as Eugene (European Green Electricity) and aims to promote high quality green electricity suppliers across Europe and to bring them together under the same standard. Eugene has therefore laid down common quality criteria in a basic set of specifications which can be supplemented by national criteria in order to adapt to local contexts.

- Eligibility: A production plant must adhere to environmental standards regarding the impact of the sources of renewable energy that it uses. In practice, this means limiting membership to the most environmentally-friendly hydro and biomass plants.
- Additionality: Green electricity must encourage the development of renewable energies by fostering the creation of renewable production capacity or improving existing capacity. This condition involves reinvesting profits in renewables.

Label-holding green energy producers are checked annually and must prove the origin of their energy. Due to this requirement, very few energy suppliers offer energy of a sufficiently high quality to be labelled.

Price

Be sure to check with suppliers that the highly attractive tariffs they use to tempt consumers are fixed and are not likely to be raised in the very near future.

Phase 2: How to switch supplier

Switching supplier is simple: you just need to sign a new contract with your chosen supplier and you will be switched automatically and free of charge, without any disruption to your supply.[3]

5. European member organisations that use green energy

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups with energy suppliers that use renewables. Emmaus Ferrara is one such group. Their contact information is also available on the website enabling anyone wishing to discuss the topic to contact them directly.

6. Non-Movement organisations involved in this area

Some countries have an advantage over others when it comes to natural renewable resources. These countries are able to produce clean energy and sell it to others who wish to consume it in Europe. Germany is one such example.

The country is the world's leading renewable energy producer and is starting to take measures to encourage the exportation of some of its energy, thus helping to combat climate change.[4]

Source: Greenpeace France: http://www.greenpeace.org/france/PageFiles/300718/ecolo-watt-rapport-complet.pdf

[4]Find out more: http://www.antananarivo.diplo.de/Vertretung/antananarivo/fr/05/Umwelt_Erneuerbare_Energien_Klimawandel/Exportinitiative_Erneuerbare_Energien_Seite.html

7. Other useful websites

- ✓ ObservER (Observatoire des énergies renouvelables) – French renewable energy certification organisation (French)
- ✓ Eugene Label (French)
- ✓ EECS – European Energy Certificate System (English)
- ✓ German green electricity label (German)
- ✓ Swiss green electricity label (German, French, English and Italian)
- ✓ Swedish green electricity label (Swedish)
- ✓ Spanish guaranteed origin and electricity label (Spanish)

Everyday ways to reduce energy use

Introduction

We now enjoy a level of comfort and unquestionable advantages due to electricity usage: heating, air conditioning, artificial lighting and telecommunications. However, all of these conveniences come at a price, both for the environment and our pockets. There is therefore a need to take simple steps to save money and protect the planet, without necessarily having to cut the comforts we enjoy.

Little by little, everyone's actions will have a positive impact for everyone: acting locally means acting globally!

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule

Implement initiatives to stop energy from being wasted.

3. The main advantages

✓ Help to preserve natural resources used to generate energy.

✓ No installation cost.

✓ Reduces your electricity bill.

4. The main disadvantages

There are no disadvantages involved when implementing this initiative.

Implementation

The following list presents ways you can reduce energy use at different times of day and in different places.

Daytime

- Taking a quick shower (five minutes) means that less water and energy is consumed.
- If the house is empty all day, it is recommended that you turn down the radiator temperature before leaving and readjust it on your return. Turning down the temperature by just one degree makes for a 7% energy saving. The recommended temperatures for an empty house during the day:
    - 16° in the bedrooms.
    - 19° in the other rooms.
    - 21° in the bathroom.
- Everywhere: You should always switch off the light when leaving a room and do not needlessly leave devices on standby. Opt for appliances and devices with an A or A+ rating, as they are more energy-efficient.

Evening

- In the kitchen: When cooking, opt for a flat bottomed pan, put lids on pans and avoid opening the oven to check whether a dish is cooking properly. These are all ways of reducing heat loss and therefore of cutting energy consumption. Adjust the fridge's thermostat (a temperature of 4° is sufficient), checking that it is properly closed, and do not place food that is still warm in the fridge – all these steps save a significant amount of energy.
- Wait until you have a full load before switching on the dishwasher and washing machine.
- Choose energy-efficient light bulbs according to usage requirements: a 5W bulb is sufficient for watching TV or working on a computer, as with a more powerful bulb the visual contrast is too great and will tire your eyes.
- Air the house for just five minutes a day in winter.

Night

- Close the shutters and lined curtains at night to keep the heat in and prevent humidity and condensation.
- Turn down the heating at night.

Other tips

- Do not cover radiators and do not use them to dry clothes.
- Do not obstruct air vents in the kitchen, bathroom and WC. Blocked air vents prevent air from circulating properly around your property and are often the cause of mould appearing on the walls.

5. European member organisations that save energy

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that save energy and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Small electronic devices are also responsible for a significant fraction of a household's energy use, as they need constant recharging or their batteries have to be replaced. Several companies have started to manufacture solar rechargeable devices, such as telephones, mp3 and mp4 players, and clocks. This saves energy and also eliminates the need for batteries: the mercury used in a single battery can contaminate up to 500l of water.

In addition, you can also separately purchase solar batteries which can be used to recharge any electronic device. These solar batteries are very easy to use: they store solar energy and use it to produce electrical energy. Solar batteries are available in different forms: they come with devices, are fitted on backpacks and even on clothing.

7. Other useful websites

- ✓ Twenty five things you can do to conserve energy (English)
- ✓ Project: how to reduce energy consumption via mobiles and the social networks (English)
- ✓ Article: Why you should not leave devices on standby (French)
- ✓ Energy consumption per inhabitant - world statistics (French)
- ✓ Effective ways of reducing energy consumption (Spanish)
- ✓ 66 ways of controlling and reducing your energy bill (Spanish)

Producing green energy

Introduction

Since the oil crisis in 1970, the world has started to seek out other renewable sources of energy. And following the nuclear accident at the Fukushima power plant in Japan, people's focus has once again turned to clean energies. Today there are several known ways of producing clean energy which do not use up natural resources. They do not contribute to global warming or generate waste that is toxic and hazardous for the environment and human health.

However, despite investment in this area, it is still hard to find a supplier, either because some countries have a single state authorised energy supplier, which does not have renewable sources (this scenario is changing because of European Union regulations) or because not enough energy is currently being generated to meet the demand.

Generating renewable energy for your own use and / or to sell any excess to the local grid is a feasible alternative which makes for long-term savings and contributes to the shift towards a sustainable society.

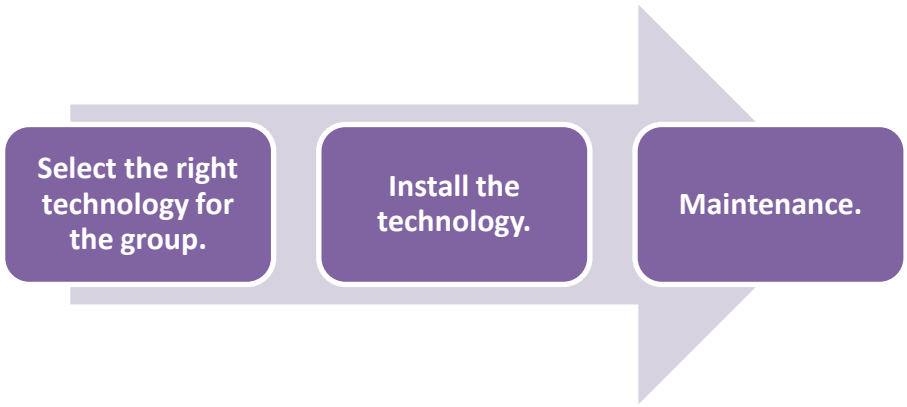
Given that the technologies used to produce energy are very variable and very complex from a technical standpoint, this factsheet presents general and basic information enabling you to make a choice. It is recommended that you obtain the opinion of competent professionals in each area if you wish to generate energy.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺
Time taken to implement	☺☺
Budget	☺☺

2. Schedule



3. The main advantages

✓ Use natural, clean and renewable resources.

✓ Cut your energy bill in the long-term.

✓ Help make the local energy grid more diverse.

✓ Contribute to a more sustainable society.

4. The main disadvantages

× Major initial investment needed.

× Trained professionals are needed to install and sometimes to maintain the systems.

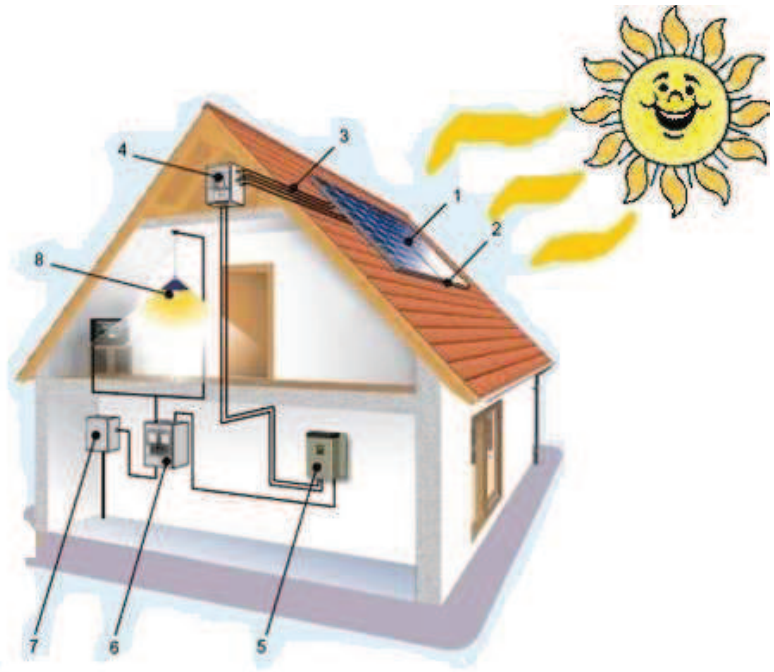
Implementation

Phase 1 – Select the right technology for the group

You firstly need to find out about the different types of renewable energy generation technology in order to select the one that best suits your group. The main technologies that can be installed in an Emmaus group are presented below.

- Solar photovoltaic energy Solar photovoltaic energy is a form of renewable **electrical energy** produced using the sun's energy. There are various ways of generating it, which means that cost and performance vary.

In basic terms, several cells are connected up in a solar photovoltaic module and then several modules are grouped together to form a system. This PV system converts sunlight into electricity without any moving parts or noise. The electricity can be stored in batteries, converted by an inverter so that it can be used on-site or exported to the grid.



1. Solar generator.
2. Mounting system.
3. On-site cabling.
4. Generator connection box.
5. Inverter.
6. Electricity meter.
7. Grid connection.
8. Device – appliance

Illustration 1 Photovoltaic panels system

Illustration 2 Installed photovoltaic panels

- Solar water heating Solar water heating harnesses the sun's **heat** and uses it mainly to **heat water**. There are various sorts of solar thermal collectors, as the panels are known. The simplest method is to paint a metal water tank black. The black layer absorbs solar energy and transfers it to the water.

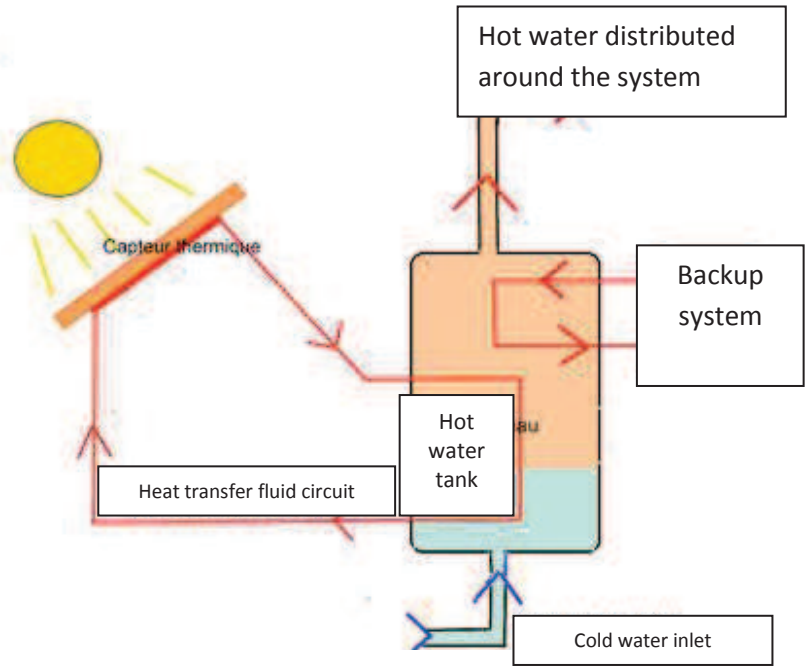


Illustration 3 Diagram showing how a solar water heating system works

Illustration 4 A collector

The best solar panels use this principle, but the surface that absorbs solar energy, known as the absorber, is enclosed in a transparent and sealed casing, which generates a greenhouse effect and increases the system's performance. This technique enables the system to work in winter. Heat is extracted using a heat transfer fluid (for example water) moving around a system of pipes.

The life expectancy of both types of solar panels is on average 25 years. Approximately 5m² of collectors will cover up to 70% of a five person family's annual hot water needs, while 10-30m² of photovoltaic panels are needed for a home.

Both of these methods of harnessing solar energy are the simplest ways of generating energy for a household, as they primarily require work on the building's roof or façade. In addition, the solar energy market is growing rapidly, making it easy to source equipment and installers. You need to obtain the following information if you wish to install a solar energy system: amount of sunlight received and the household's energy requirement. The following map gives an overview of average sunlight in Europe between 2004 and 2010.

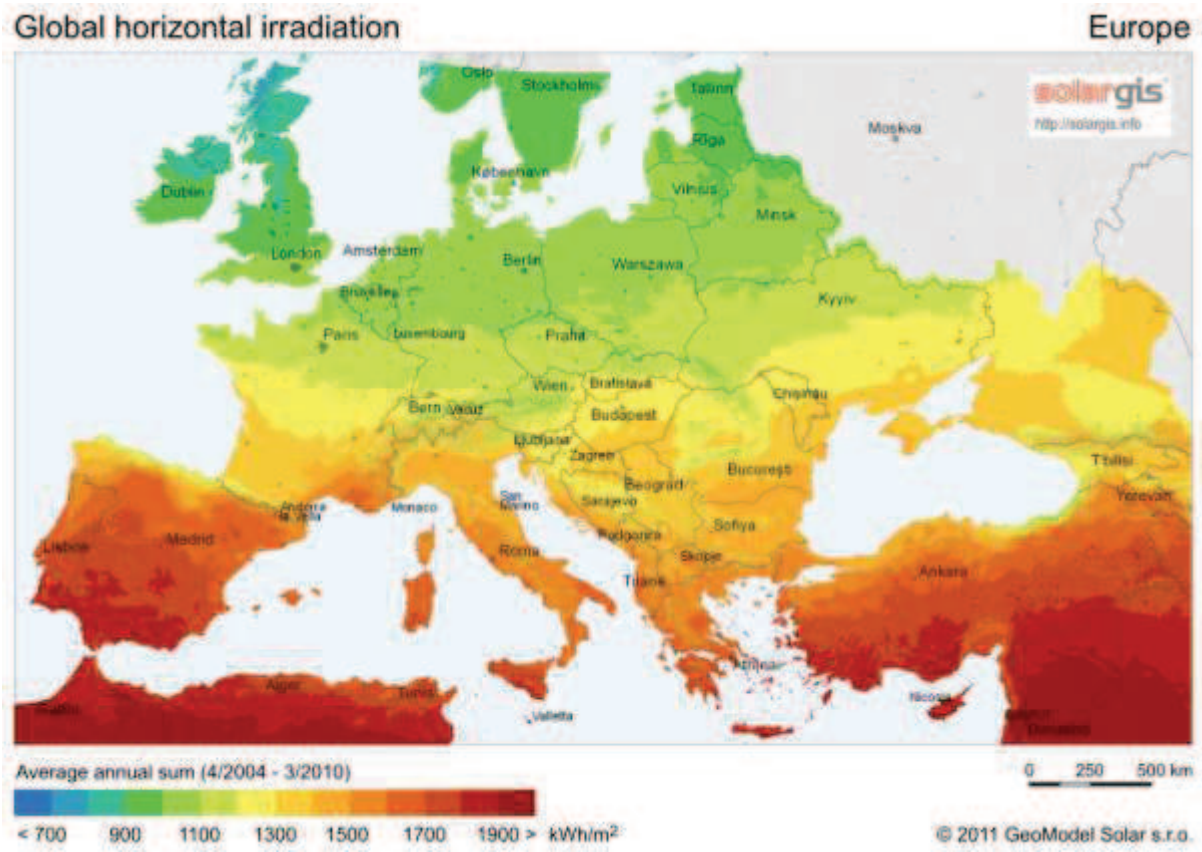


Illustration 1 Global horizontal irradiation in Europe

* Source: http://solargis.info/doc/index.php?select=71

- Biomass energy (wood): Biomass energy basically involves using wood as a fuel to heat the house, with the surplus being stored in a cylinder or hydro-accumulation tank. It should be stressed that this is a renewable source of energy if the wood comes from sustainably managed forests and that this technology does generate waste (sludge). In some cases, this waste can be used as garden or vegetable garden fertiliser.

If you wish to install a wood-fuelled boiler, you firstly need to check the building's heat loss, as this will affect boiler power and the size of a storage tank if installed. The following questions then need to be answered in order to design the system: should a

cylinder or tank be used to store the heat? What sort of wood will be used? Is any other infrastructure, such as a crusher[1] to ready the wood for use, or a silo needed?

Table 1 Comparison done in France: different wood-fuelled boiler installation scenarios

Comparison	A recent well insulated house with living space of 140m²	Old house with living space of 140m²
Boiler power needed	10 - 15 kW	20 - 25 kW
Annual pellet consumption	**2.5 tonnes**	**5 tonnes**
Fuel cost	€350 - 450	€700 - 900
Maintenance (annual)	**Approx €120**	**Approx €120**
Silo volume for annual autonomy	Approx 5m²	Approx 10m²

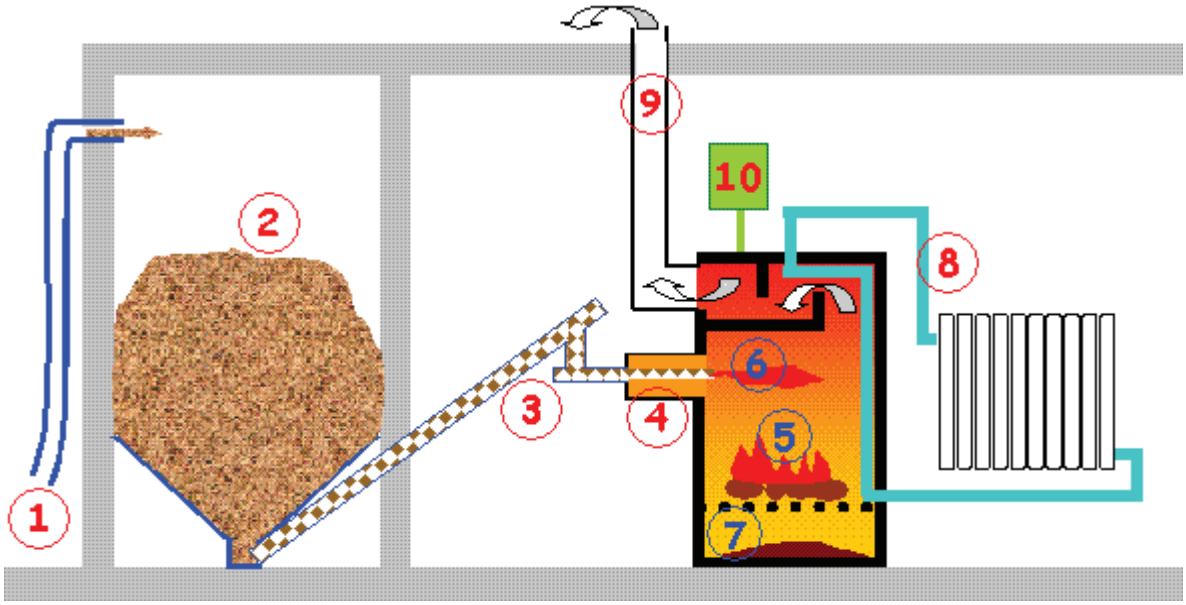


Illustration 5 Wood-fuelled boiler diagram

1. Pellet delivery inlet.
2. Storage silo.

[1] Crusher: A machine used to reduce the size of the wood (for a wood-fired boiler).

3. Feedscrew.
4. Pellet burner.
5. Log chamber
6. Pellet chamber
7. Ash tray
8. Hot water and central heating circuit.
9. Chimney
10. Control panel

- Wind energy Wind energy is harnessed via a wind turbine. The wind turbine is connected to a generator to produce DC or AC electricity. The generator is connected to the grid or functions as part of an autonomous system.

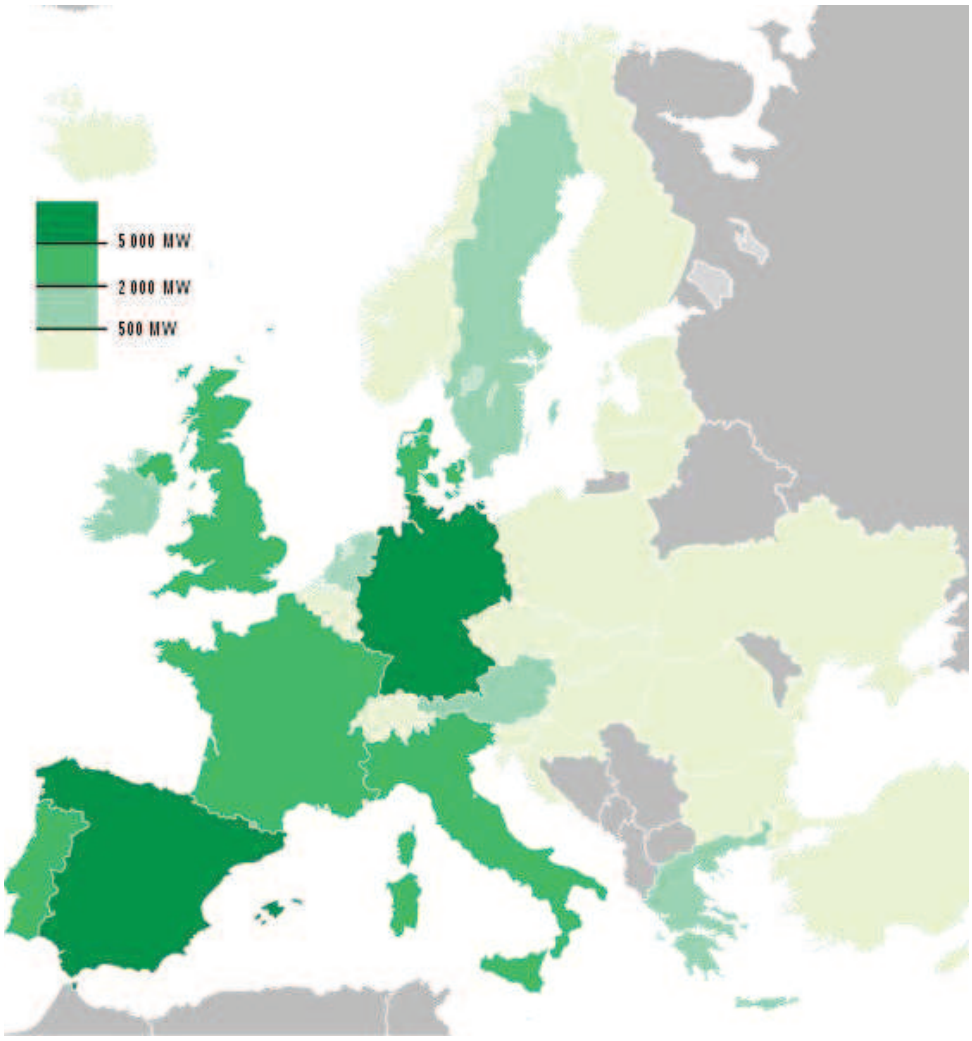
The energy yield and power of wind turbines depend on local wind speed. Wind energy is more of an industrial technology, however a number of initiatives have started to develop small turbines (nominal power under or equivalent to 30kW in Europe), i.e. a single domestic turbine. An urban wind turbine generates a relatively small amount of electricity and depends on wind speed and availability. It is therefore difficult to predict in advance how much electricity a turbine will generate[2].

[2]Source: http://www.landes.org/files/cg40/environnement/Guide-petit-eolien.pdf

1. Wind turbines
2. Regulator.
3. Regulator.
4. Inverter.
5. Batteries.
6. Personal consumption.

Illustration 6 A small wind turbine system

Illustration 7 Example of a small wind turbine in an urban setting



Map 2 Map showing wind power generated in Europe in 2007.

The system can be connected to the grid or used as power supply on an isolated site. This is the case for energy generated by photovoltaic solar systems and small wind turbines.

Phase 2: Installation and Phase 3: Maintenance

It is recommended that you work with professionals who will be able to advise you on the best course of action in both phases.

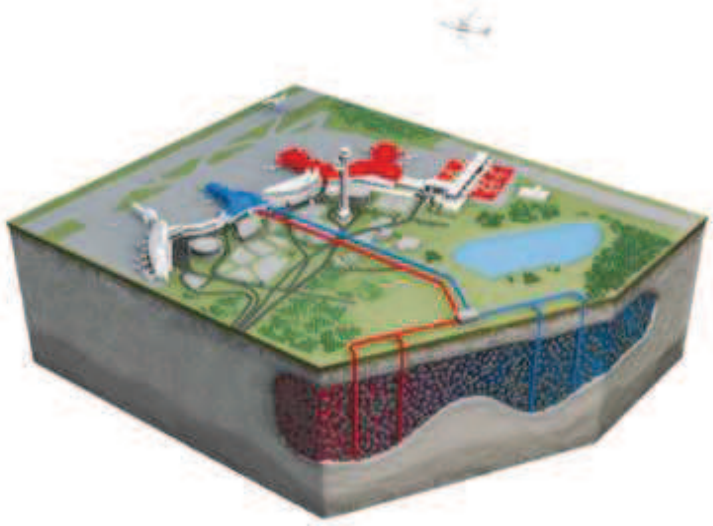
5. European member organisations that generate energy

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that produce renewable energy and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Arlanda airport heated by geothermal power Stockholm Arlanda Airport is located close to the Swedish capital and the ground underneath the airport contains the largest energy storage unit in the world. An aquifer – which is almost 2km long – is used to cool and heat the terminals, which cover an area of 0.5 million m².

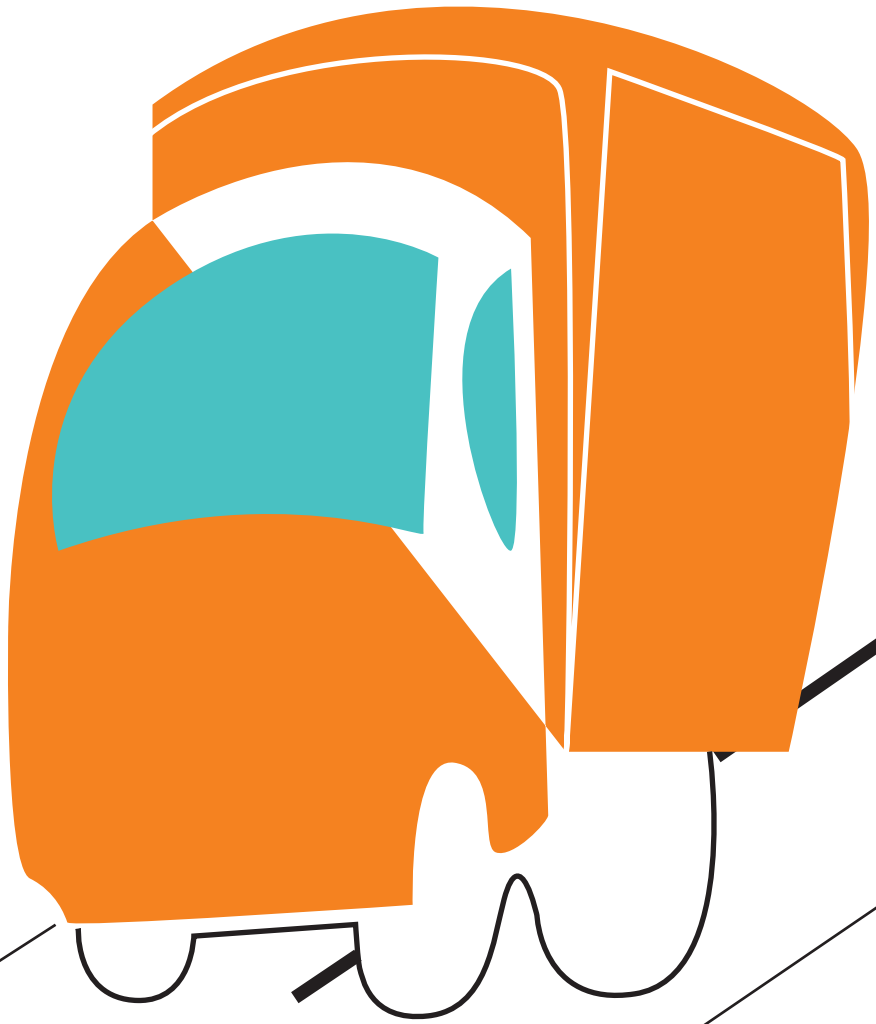
In summer, cold water is pumped up from the aquifer and feeds into the airport's air conditioning system. The heated water is then sent back into the ground where it is stored until winter, when it will be used to melt snow on the airport aprons and to preheat the building ventilation system air. The aquifer has a volume of over 2 million m³, of which 30% is water. The following diagram shows how the site works.



7. Other useful websites

- ✓ Producing solar energy: all the information you need to become a producer (French)
- ✓ How to set up a house for solar power (English)
- ✓ How solar energy works (Spanish)
- ✓ Installing a wood-fuelled boiler (French)
- ✓ Do it yourself wood-fuelled boiler (English)
- ✓ Biomass energy - wood (Spanish)
- ✓ Small wind turbine technical information sheet (French)
- ✓ Small-scale wind turbines: benefits, how they work, cost (English)
- ✓ How to build a small wind turbine (Spanish)

TRANS-PORT



7

Car sharing

Introduction

Car sharing or car pooling involves several people travelling in the same car on a given journey and helps to significantly reduce travel costs.

Fewer cars on the road means fewer traffic jams and therefore less stress for drivers. The driver feels responsible for their passengers and therefore drives more carefully, meaning that the risk of having an accident decreases.

Car sharing is also a chance to meet your neighbours, maybe make new friends and is definitely a break from your daily routine.

Finally, fewer cars on the road helps to reduce pollution.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

2. Schedule

Car pooling is a simple initiative that does not require any prior planning.

3. The main advantages

✓ Reduce pollution emitted by cars.

✓ A more sociable travel experience with several passengers.

✓ All those involved save money.

4. The main disadvantages

× You may potentially have to stop several times to drop off people at their respective destinations.

Implementation

Finding a car share

Car sharing involves sharing your vehicle for a given journey at a specified time.

Are you a driver? Place your advert listing your contact details, journey and the time you leave.

There are two possible scenarios:

- Car share and receive a cash contribution: you transport passengers. You can decide whether to ask passengers for a cash contribution.
- Take it in turns to car share: the drivers take it in turns to drive. In this case, no money changes hands.

- Are you a passenger? Get in touch with a driver and come to an agreement about any cash contribution or about taking it in turns to drive if you have a car.

Car sharing rules

- Respect the Highway Code and be extra careful when carrying passengers.
- Be punctual.
- Ask if it is ok to smoke.

5. European member organisations that car share

Emmaus Europe website's Environment section contains the Sharing environmental activities and practices search engine (click here). The search engine enables you to identify European groups that car share and to view their contact information, so that anyone wishing to discuss this topic can get in touch with them directly.

6. Non-Movement organisations involved in this area

Dozens of websites are used worldwide by people looking to car share and these sites are proving to be a real success. Car sharing websites are secure and professional and enable users to cut travel costs and meet other people.

The following list contains other useful websites.

7. Other useful websites

- ✓ Car sharing France (French)
- ✓ Car sharing in Europe (multilingual)
- ✓ The Car Sharing organisation (multilingual)

Walking or cycling short distances

It is possible to walk or cycle short distances of under 2km. Walking or cycling helps to keep you fit and to save money. The following statistics highlight the benefits of walking and cycling short distances.

If you drive, the first kilometre is twice as polluting as the others, with fuel consumption stabilising between the third and sixth kilometre of your journey. 25% of car journeys in urban areas do not exceed 1km, 40% do not exceed 2km and 50% do not exceed 3km.

It takes six minutes to walk 500m in a town. As a car driver takes on average eight minutes to park their car, it is worthwhile considering walking or cycling short distances.

Fuel consumption is 50% higher than average during the first kilometre driven. The catalytic converter does not function correctly over that distance (and only works properly once the gases have reached a temperature of 300°C). You can save €940 if you make short journeys totalling 7,000km a year![1]

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺☺☺

[1] Source: http://www.econo-ecolo.org/Privilegiez-le-deplacement-a-pied-ou-en-velo-pour-les-distances

2. Schedule

Walking or cycling short distances is a simple initiative that does not require any prior planning.

3. The main advantages

- ✓ Reduce pollution emitted by cars.
- ✓ Physical activity and wellbeing.
- ✓ Saves money because it is free.

4. The main disadvantages

There are no disadvantages for short distances.

Electric and natural gas vehicles

Introduction

Vehicle transport is a modern-day convenience and a necessity. However, with climate change being an issue, vehicle use is also a problem because of the polluting gases that they emit.

Traditional vehicles release C02 into the air (one of the pollutants responsible for climate change) and also so-called 'air pollutants' that affect human health and the environment. Although significant progress has been made towards reducing and even eradicating these emissions (lead, carbon monoxide and benzene in particular), further efforts still need to be made to reduce fine particle and nitrogen oxide vehicle emissions.

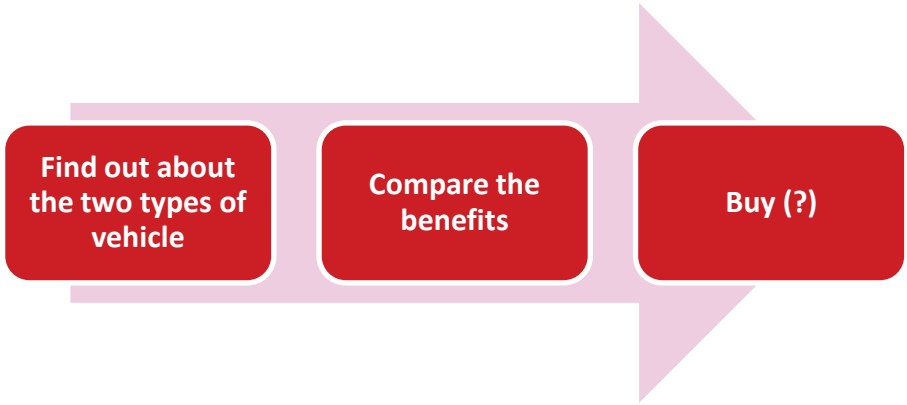
The European Union has brought into force regulations governing emissions. Nevertheless, the use of 'clean' vehicles, apart from circumventing the problem itself, helps to make for a healthier urban environment and to preserve the planet for future generations.

Practical information

1. Factors

Factor	Rating
Overall complexity	☺☺☺
Time taken to implement	☺☺☺
Budget	☺

2. Schedule



3. The main advantages

✓ Reduces the amount of pollution generated by fossil fuels.

✓ Reduces dependence on oil-producing countries.

4. The main disadvantages

× Need to recharge and distribution network for electric vehicles.

× Unstable nature of the natural gas market for gas vehicles.

× Price is still high.

Implementation

Find out about the two types of vehicle

Electric vehicles

An electric car is propelled by electric motors, using electrical energy stored in storage batteries, a fuel cell (hydrogen or methanol) or a heat engine (Wankel, Stirling or standard engine).

Traditional battery-powered electric cars can be divided into:

- Battery powered electric vehicles.
- Fuel cell system electric vehicles and
- Petrol electric cars.

Hybrid electric battery powered vehicles with extended ranges are also available (EREV, *Extended Range Electric Vehicle*[1]*).* The car is generally fitted with one or several electric motors whose total power may range from 15kW to over 200kW, depending on vehicle size, usage and target performance.

Although electric vehicles are currently recommended for urban driving, their power may still represent a drawback that stops people from purchasing them. However, most emissions are generated in urban areas and the main advantage of electric vehicles is that they do not emit any pollutants or greenhouse gases.

Illustration 1

Car with a driving range of 135km. The vehicle also has a solar energy powered air conditioning system.

[1] Find out more: http://www.automobile-propre.com/definitions/erev/

Illustration 2

An electric bus presented at the European Public Transport Trade Fair.

Natural gas vehicles

The NGV (natural gas vehicles) available in Europe are bi-fuel vehicles, although they run on a single type of fuel at a time. They have petrol internal combustion engines. This means that they can run on either petrol or natural vehicle gas stored in a tank in the boot. The driver chooses which fuel to use by operating a switch on the dashboard. Several carmakers sell bi-fuel cars.

A major advantage of these vehicles is that any petrol vehicle can be converted into a bi-fuel vehicle. Authorised garages can convert vehicles, which involves installing a NVG tank in the boot, the pipes, natural gas injection system and the electronics. Apart from reducing fuel costs and dependence on oil-producing countries, another major plus point of NGV is that they reduce pollution.

Illustration 3

There are also buses that run on NVG

In summary, if we compare these two types of vehicles, it can be said that electric vehicles are recommended for urban driving, while natural gas vehicles offer better performance for longer range driving.

Apart from these considerations, electric cars on average cost 30% more than traditional vehicles[2]. On the other hand, natural gas vehicles cost about the same as standard vehicles.

5. Non-Movement organisations involved in this area

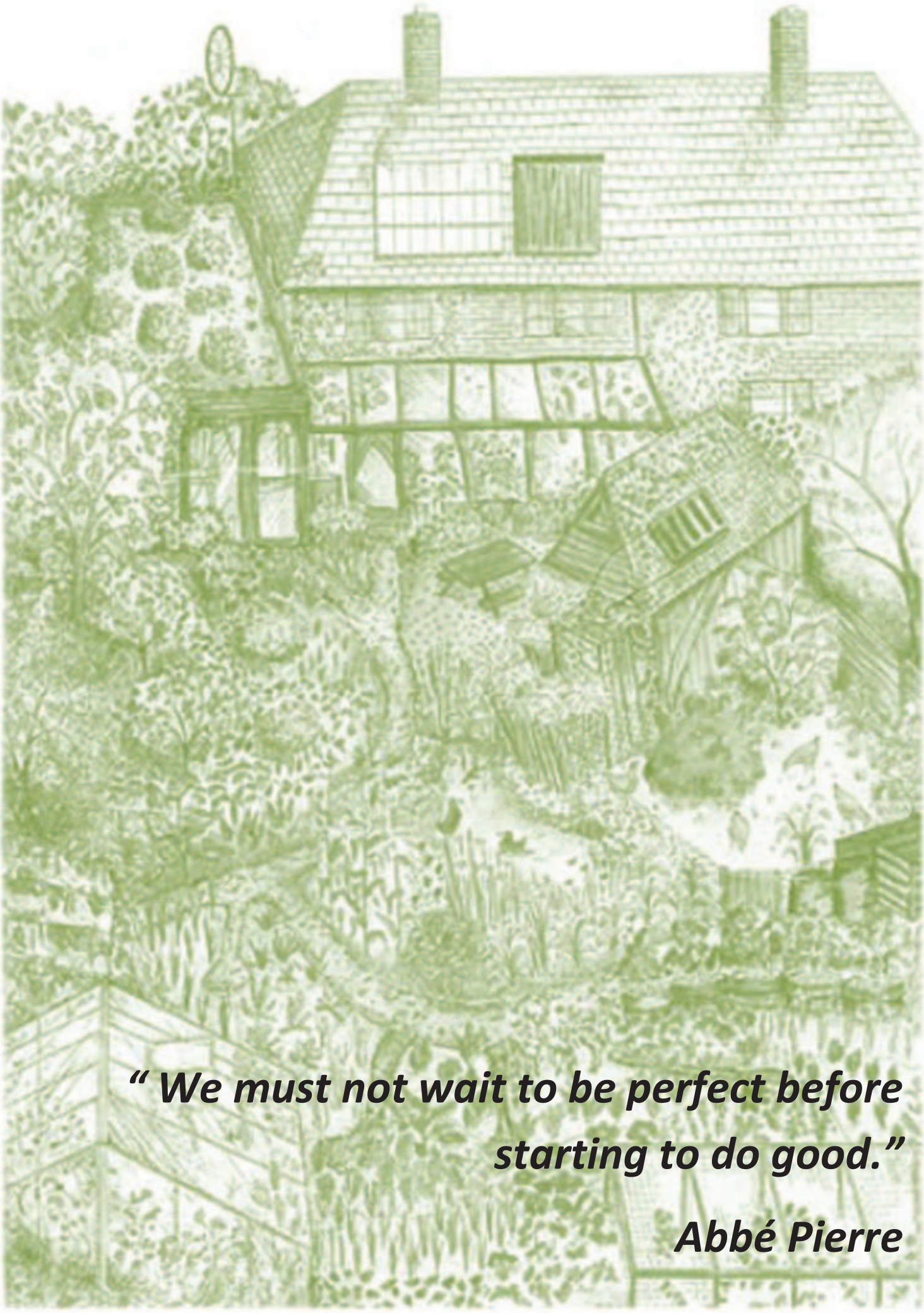
Since October 2011, the city of Paris in France has had a network of electric vehicles called **Autolib'[3].** Autolib' is the first self-service electric car public rental service to be rolled out across a large European city. The cars' electric engines do not produce micro particles or exhaust fumes, meaning that everyone can help France to meet its commitment to reduce these pollutants by 20% by 2020.

Source: http://observatoirecetelem.com/medias/pdf/france/2012/observatoire-cetelem-de-l-automobile-2012.pdf
Find out more: https://www.autolib.eu/une-revolution-urbaine/

The 3,000 **Bluecars** planned for rental in Paris and the surrounding area represent a reduction in private vehicles estimated to be around **22,500**, that's the equivalent of **164,500,000 km driven per year** by polluting vehicles. So there will not only be less pollution but also fewer traffic jams and less stress, giving everyone more time for themselves.

6. Useful websites

- ✓ Choosing a car (French)
- ✓ Car tips (driving, servicing, changing car etc) (French)
- ✓ Article from Forbes® magazine: Which are better - electric cars or natural gas vehicles? (English)
- ✓ MIT report on the Electrification of Transportation Systems (English)
- ✓ How electric and natural gas vehicles improve air quality (Spanish)
- ✓ Advantages and drawbacks of eco-friendly vehicles (Spanish)



“ We must not wait to be perfect before starting to do good.”

Abbé Pierre