CIWM

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Executive Summary

Making Waste Work: A Toolkit

Community Waste Management in Low and Middle Income Countries

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wasteaid.org.uk/toolkit

This toolkit has been produced by WasteAid UK
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WasteAid UK is a charity working to make an impact on the global waste emergency by:

- Partnering with local organisations to improve the health, environment and livelihoods of people without waste services.
- Building the skills of local people to deliver practical solutions to the waste management crisis in their own communities.
- Raising awareness of the benefits of proper waste management and campaigning for greater change.

www.wasteaid.org.uk

CIWM (Chartered Institution of Wastes Management) is the leading professional body for the resource and waste management sector, representing around 6,000 individuals in the UK, Ireland and overseas. It awards the title of Chartered Waste Manager to qualifying members.

The objectives of the CIWM are to advance the scientific, technical and practical aspects of wastes and resource management worldwide for the safeguarding of the natural environment, to promote education, training, and research in wastes and resource management, and the dissemination of knowledge of the topic; and to strive to achieve and maintain the highest standards of best practice, technical competence and conduct by all its members.

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1. Foreword

Solid waste management sits alongside electricity and gas, water supply and sewerage, transport, communications and the internet, as one of the essential utility services on which modern society depends. But it seldom gets the recognition or the political priority that it needs and deserves.

I had the privilege to lead work for the United Nations Environment Programme and the International Solid Waste Association on their inaugural *Global Waste Management Outlook* (GWMO), published in 2015. This reported that more than two billion people worldwide do not have a waste collection service and, in total, the waste of more than three billion people isn't disposed of safely. These numbers are likely to increase as populations grow and more people migrate to urban areas.

Where there are no waste management services, people and communities have no option but to burn or dump their waste. These widespread practices increase the spread of disease and the risk of floods, negatively impact local economies and contribute to climate change and marine plastic litter: major global challenges in their own right. The global waste management crisis must be addressed.

Many of the recommendations in the GWMO involve 'top down' solutions, focused around how international organisations and national governments can work with (often the larger) cities to develop integrated and sustainable waste management systems. However, it does also recognise the need for parallel work from the 'bottom up', in particular community-based waste management initiatives which both tackle the local waste crisis and create sustainable livelihoods. Such approaches are often the only hope for many smaller cities, towns and villages, as well as informal settlements around larger cities, where local authorities simply do not have the resources to provide any level of waste management service.

When I had the opportunity, therefore, to select a project to be funded by CIWM to mark my Presidency, I chose a particular GWMO recommendation on the need to prepare practical guidance on low cost 'waste to wealth' technologies, which involve minimal capital investment and make products to sell in a local market. This fits well with CIWM's objects under our Royal Charter "to advance for the public benefit the art and science of wastes management worldwide", and also with our focus on developing the skills of waste professionals.

Making Waste Work is a practical toolkit, developed for CIWM by WasteAid UK. An early draft was 'field tested' at a workshop in The Gambia for community-based organisations from 11 low and middle income countries. Specific chapters and the How-to guides have also benefitted from the input of CIWM members and global development practitioners. It is designed to be used as an online and offline resource to motivate and inspire people to tackle the waste crisis locally, wherever they are.

Now is the time for communities to act; it is often too late to wait for outside support. Where there is no municipal service for waste management, communities must be empowered to do something for their own safety and wellbeing. *Making Waste Work* has been produced to facilitate such action.

Prof David C Wilson
President CIWM
October 2017

2. Making Waste Work: A Summary

A — Be informed: Community waste management essentials

The challenge

Some two billion people around the world, mostly in low income countries, do not have their waste collected. With no option other than to dump or burn waste, communities become unhealthy and hazardous places to live.
Dumping and burning waste damages people's health, and is especially harmful for children. If livestock eat waste they can become ill and even die. Waste blocks drains and leads to flooding, while burning waste releases smoke that is harmful to health and contributes to climate change.
The amount of waste accumulating on land and in the oceans is now a global crisis, with waste polluting even the remotest parts of our planet.

The opportunity

Fortunately, managing waste properly does not need to be expensive or complicated.

Communities in lower-income countries where there is no waste service can still reduce the amount of waste they generate, and separate materials such as food waste and plastics.

When waste materials are kept separate, they can be turned into new, useful products for local markets. With simple tools and the right knowledge, people can become self-employed recycling entrepreneurs, providing a very valuable service for the health and wellbeing of their community, and the whole planet.

B — Be prepared: Planning a community waste project

Know the materials

Understand the common materials in waste, the problems they can cause, and the opportunities they present. Analyse the waste that is locally available and identify which materials to work with. Explore whether it is best to sell to an existing recycling market or convert waste materials into new products.

Choosing the right recycling project

Selling materials to an existing recycling market can be the quickest and easiest approach. Markets don't exist everywhere however, so making your own recycled products is the next best step.

Make sure you have regular access to the materials and choose the most appropriate technology.

Develop a business plan

Test whether there will be a market for your product locally. Calculate the cost of making your product, including collection, transport, processing and marketing costs. Practise making your product until it is of a good quality. Give away some free samples and ask for feedback. Market your product to potential new customers.

Get help and support

It is much easier to work as a team. Talk to the community with tailored messages about the benefits of waste management. Encourage them to get involved and become advocates. Get support from government by demonstrating the benefits of your approach. Share your work with other communities and be prepared to help them.

C — Be inspired: How to transform waste into a resource

Integrated waste management

1 Measure your waste

11 Waste collection

12 Waste disposal

Organic wastes

2 Woody waste into fuel briquettes
3 Organic waste into biogas
4 Fish waste into animal feed
5 Organic waste into compost
6 Organic waste into compost using worms

Plastics

7 Selling plastics to the market
8 Plastic film into building materials
9 Plastic waste into ecobricks
10 Plastic film into crocheted bags

3. Introduction

3.1 Why the *Making Waste Work* toolkit?

A growing global population, urbanisation, and changing consumer lifestyles have led to a global waste crisis. Regular waste collection is taken for granted in wealthier parts of the world, but in 2017 there are still more than two billion people living mostly in low and middle income countries without this basic service. The waste of more than three billion is not disposed of safely[1].

When there is no municipal waste collection people have no option but to dump or burn their waste close to where they live. These practices damage the health of children (see Figure 1), cause water and air pollution, accelerate climate change, block urban drainage systems, aggravate floods and spread infectious diseases. However, the public health and environmental impacts are not just local: uncontrolled dumping and open burning also contribute to global climate change and the abundance of plastics in the marine environment.

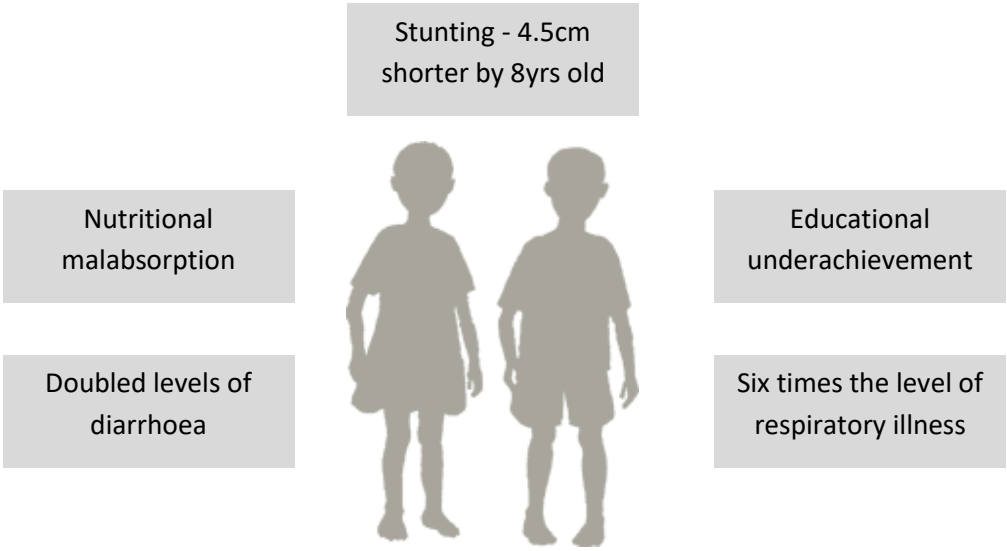


Figure 1: The health impacts on children of unmanaged waste are particularly concerning[2].

There has been some effort among both the international development and academic communities to understand and document the scale of the growing waste crisis, and large-scale, city-wide solutions. Typically, these systems are funded through a combination of municipal taxes and the sale of large quantities of separated and bulked materials to global recycling markets.

However, despite these positive advances, there are still billions of people in desperate need of waste management services that their municipalities are simply unable to provide. These communities will benefit from accessible information about alternative models of waste management, which is what the *Making Waste Work* toolkit aims to provide.

[1] UNEP-ISWA (2015) Global Waste Management Outlook.
[2] UN Habitat (2010, 2012), Humphrey (2009), Boadi (2005). *See Making Waste Work Toolkit for full references.*

3.2 Waste management: an engine for sustainable development

The Global Goals for Sustainable Development were agreed by the leaders of 193 countries in 2015. The 17 Goals, which have 169 targets among them, aim to bring an end to extreme poverty, inequality and climate change by 2030. There are many linkages between the Global Goals and improved waste management – poverty reduction, improved health and equality, provision of clean energy, cleaner cities and healthier populations, and the protection of air, land and water from pollution. Making progress in addressing waste management issues will contribute directly to 12 out of the 17 Sustainable Development Goals.

Waste management can help deliver all Sustainable Development Goals SUSTAINABLE DEVELOPMENT GOALS ***Key:*** *dark grey = direct link* *number = target that explicitly requires a basic level of waste management* *light grey = indirect link*	1. Access for all to basic waste collection services	2. Stopping uncontrolled dumping and open burning	3. Managing all waste properly, particularly hazardous waste	4. Reducing waste and creating recycling jobs	5. Halving food waste from markets, shops and homes, and reducing food losses in the supply chain	*'Governance' factors which underpin sustainable waste management*
1 NO POVERTY	1.4					
2 ZERO HUNGER						
3 GOOD HEALTH AND WELL-BEING						
4 QUALITY EDUCATION						
5 GENDER EQUALITY						
6 CLEAN WATER AND SANITATION		6.3				
7 AFFORDABLE AND CLEAN ENERGY						
8 DECENT WORK AND ECONOMIC GROWTH						
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE						
10 REDUCED INEQUALITIES						
11 SUSTAINABLE CITIES AND COMMUNITIES	11.1 11.6	11.6	11.6			
12 RESPONSIBLE CONSUMPTION AND PRODUCTION			12.4	12.5	12.3	
13 CLIMATE ACTION						
14 LIFE BELOW WATER						
15 LIFE ON LAND						
16 PEACE, JUSTICE AND STRONG INSTITUTIONS						
17 PARTNERSHIPS FOR THE GOALS						

Figure 2: Waste and the Sustainable Development Goals. Managing waste properly can help deliver all the Sustainable Development Goals[3].

[3] For more information about the Sustainable Development Goals and targets visit sustainabledevelopment.un.org/sdgs

3.3 What is community waste management?

Processing waste materials locally can help meet local demand for sustainable fuel, soil enhancer and construction materials. The sale of these products can generate a demand for clean, separated materials, thereby transforming the local waste problem into an opportunity. Recognising and treating *waste* as *resources* provides a cost-effective way to deliver waste management in smaller communities.

A common example is plastic packaging waste. When dumped it can block drains leading to flooding and stagnant water, allowing insects to breed, and often end up in the oceans where it is a major source of marine plastic, itself a global crisis. If burned, plastic is harmful to lungs, eyes and skin, and is a major contributor to urban air pollution. Meanwhile, food and organic waste can attract vermin that spread disease, and when rotting in a dump releases methane, a powerful climate changing gas.

These materials (and more) are usually mixed together and it is challenging to recover any value from them. When the different materials are kept separate, however, they can be managed safely and even used to generate a small income. The toolkit shares simple and low-cost techniques for people to address the waste problem in their own communities. Community-scale waste management empowers people to protect their own and their children's health, and tackle a shared, global challenge.

Community waste management – a definition

Waste management and recycling practised by community based organisations. These could be in provincial towns, villages, remote rural areas, small island communities or parts of cities in low and middle income countries where there is no, or inadequate, municipal waste management service.

Community waste management includes waste reduction, collection, sorting, selling materials, recycling, composting, and safe disposal. Importantly, the techniques are low-cost and do not require specialist knowledge or skills.

3.4 Who is the toolkit for?

The toolkit has been designed for community and civil society leaders, non-governmental organisations, and waste and resource managers who want to understand how to set up small-scale community recycling and waste management schemes in lower and middle income countries. Part A will also be useful for international agencies, national governments, cities and municipalities, the formal waste and resources industry, and anyone wishing to develop their understanding of the global waste crisis and how to tackle it.

3.5 How do I use the toolkit?

The toolkit is divided into three parts. Part A: Be informed, sets out the essentials of community waste management, focusing on both the challenges and the opportunities. Part B: Be prepared, breaks down the process of understanding the different materials in waste, how they can be

recycled into new products, and the key considerations to starting a community-scale project with waste. Part C: Be inspired, provides inspiration and how-to guides so that people can gain the necessary skills to transform waste into a resource. By following the advice in the toolkit, communities may be able to recover up to 80% of their waste and turn it into useful products.

4. Be informed: Community waste management essentials

Where there is no waste management service, communities have two options:

1. Wait for outside intervention from national or local government, perhaps with support from international aid agencies. In the meantime, continue in the same way, with waste accumulating and causing health, economic and environmental problems; or
2. Work together to find a better way to manage their waste, and turn a problem into an opportunity.

As well as making the community more clean and safe, community waste management brings local economic benefits:

- Local youth, women and marginalised groups can become involved in waste collection and reprocessing activities as a source of income and employment.
- New products made in the community from waste, such as low-smoke cooking fuel, organic compost, and construction materials can be used instead of buying-in expensive alternatives.
- A stronger, healthier community is better able to continue with their daily work.

To be financially sustainable, community waste management should focus on low-cost activities and be carried out as close to the source of waste as is safe and sensible to limit the need for transport and electricity.

Processing waste locally keeps the value of the materials in the local economy.

Essential rules: With the right knowledge, everybody can reduce the amount of waste they produce and can sort waste materials for proper management. Some materials already have strong international markets, and it might be possible to bulk and sell the materials on. For everything else, it is important to separate the materials that can be recycled, and then dispose safely of what is left.

4.1 Planning your community waste project: key steps

Managing waste in your community can be a very positive and valuable activity. It is important to plan and communicate your ideas to others, as this will give you a greater chance of success.

Figure 3: Key steps to planning a community waste management project[4].

[4] Chapter numbers in the circle relate to the full version of *Making Waste Work: A Toolkit*.

5. The common materials in waste

Food waste

Common problems

Attracts vermin that spread disease

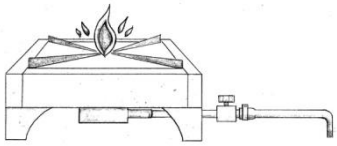
Pollutes waterways

Releases methane gas which accelerates climate change, leading to floods and droughts

Opportunities

Animal feed
(How-to 4)

Compost
(How-to 5 and 6)



Biogas (cooking fuel)
(How-to 3)

Woody waste

Common problems

Blocks drains, leading to flooding and collecting stagnant water where mosquitoes breed

Sets on fire easily

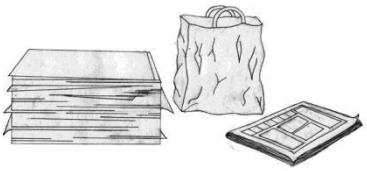
Releases methane gas (climate change)

Opportunities

Charcoal briquettes
(How-to 2)

Compost
(How-to 5)

Paper and card



Common problems

Blocks drains (flooding and mosquitoes)

Sets on fire easily

Breaks down very slowly

Releases methane gas (climate change)

Opportunities

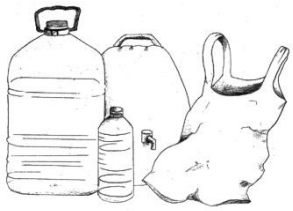
Collect and sell
(How-to 7)

Charcoal briquettes
(How-to 2)

Compost
(How-to 5)

Figure 4: Different waste materials can be processed in a variety of ways to make useful products (food waste, woody waste, paper and card). See illustrated How-to guides in Part C of the full toolkit.

Plastics



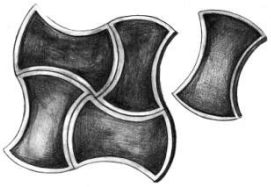
Common problems

Hazardous if burned; Blocks drains (flooding and mosquitoes)

Enters the food chain (on land, in rivers and in the oceans) where even small amounts harm wildlife, crops, livestock and human health

Opportunities

Collect and sell (How-to 7)

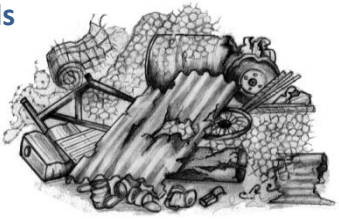


Paving tiles (How-to 8)

Ecobricks (How-to 9)

Woven bags (How-to 10)

Metals



Common problems

Can cause injury

Enters the food chain (on land, in rivers and in the oceans) where even small amounts harm wildlife, crops, livestock and human health

Opportunities

Collect and sell (How-to 7)

Melt to make something new (see local metal worker)

Glass

Common problems

Broken glass can cause injury

Blocks drains (flooding and mosquitoes)

Opportunities

Collect and sell (How-to 7)

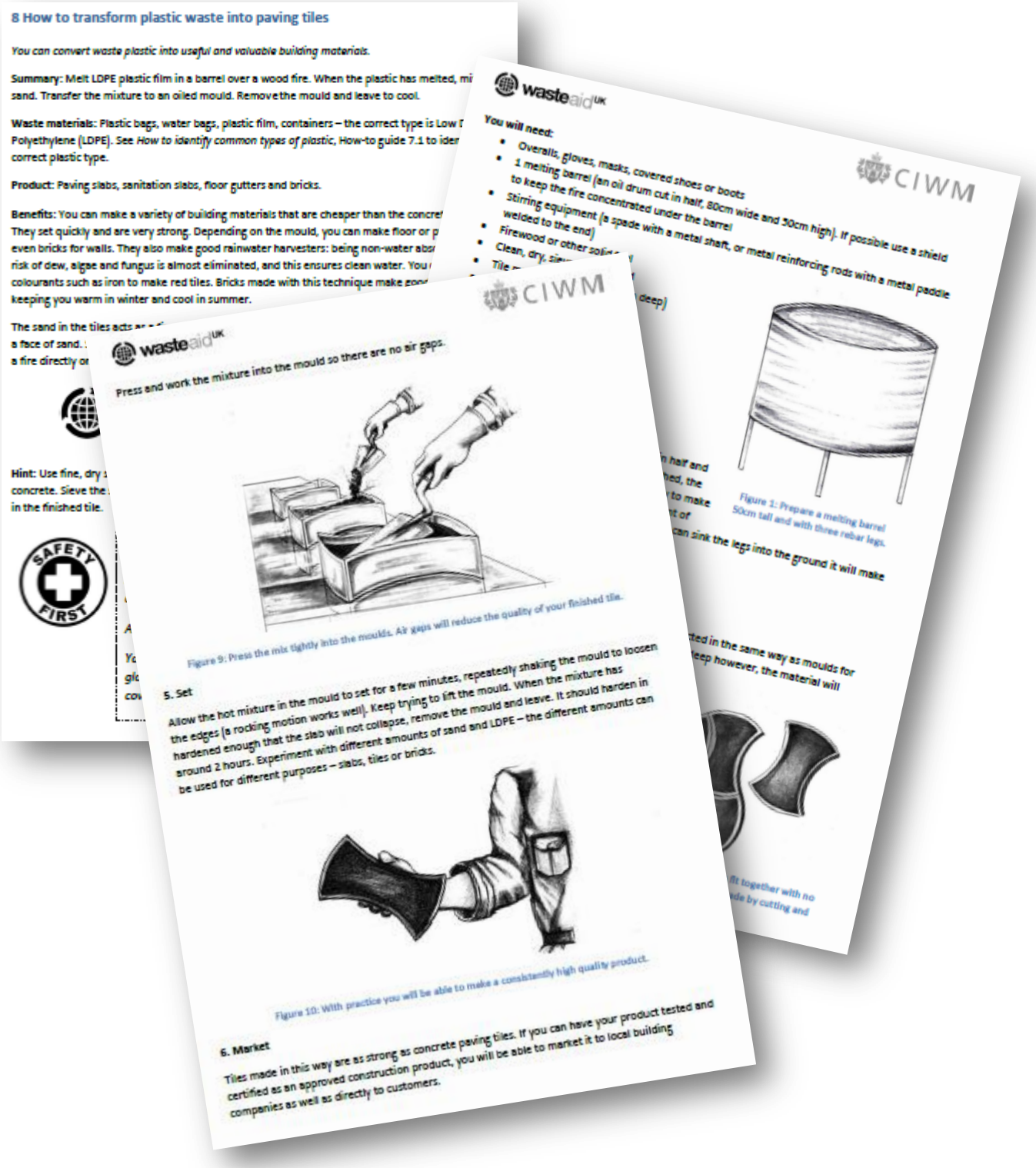
Ecobricks (How-to 9)

Grind into sand (see local construction worker)

Figure 5: Different waste materials can be processed in a variety of ways to make useful products (plastics, metals, glass). See illustrated How-to guides in Part C of the full toolkit.

6. Be inspired: how to transform waste into a resource

The how-to guides presented in Part C of *Making Waste Work* provide simple instructions for transforming waste materials in useful resources. The example below is from how-to guide 8, *How to transform plastic waste into paving tiles*.



8 How to transform plastic waste into paving tiles

You can convert waste plastic into useful and valuable building materials.

Summary: Melt LDPE plastic film in a barrel over a wood fire. When the plastic has melted, mi
sand. Transfer the mixture to an oiled mould. Remove the mould and leave to cool.

Waste materials: Plastic bags, water bags, plastic film, containers – the correct type is Low
Polyethylene (LDPE). See *How to identify common types of plastic*, How-to guide 7.1 to ider
correct plastic type.

Product: Paving slabs, sanitation slabs, floor gutters and bricks.

Benefits: You can make a variety of building materials that are cheaper than the concre
They set quickly and are very strong. Depending on the mould, you can make floor or p
even bricks for walls. They also make good rainwater harvesters: being non-water abs
risk of dew, algae and fungus is almost eliminated, and this ensures clean water. You
colourants such as iron to make red tiles. Bricks made with this technique make goo
keeping you warm in winter and cool in summer.

The sand in the tiles acts
a face of sand.
a fire directly o

Hint: Use fine, dry
concrete. Sieve the
in the finished tile.

SAFETY FIRST

You will need:

- Overalls, gloves, masks, covered shoes or boots
- 1 melting barrel (an oil drum cut in half, 80cm wide and 50cm high). If possible use a shield to keep the fire concentrated under the barrel
- Stirring equipment (a spade with a metal shaft, or metal reinforcing rods with a metal paddle welded to the end)
- Firewood or other soli
- Clean, dry, si
- Tile

deep)

Figure 1: Prepare a melting barrel 50cm tall and with three rebar legs.

Press and work the mixture into the mould so there are no air gaps.

Figure 9: Press the mix tightly into the moulds. Air gaps will reduce the quality of your finished tile.

5. Set

Allow the hot mixture in the mould to set for a few minutes, repeatedly shaking the mould to loosen the edges (a rocking motion works well). Keep trying to lift the mould. When the mixture has hardened enough that the slab will not collapse, remove the mould and leave. It should harden in around 2 hours. Experiment with different amounts of sand and LDPE – the different amounts can be used for different purposes – slabs, tiles or bricks.

Figure 10: With practice you will be able to make a consistently high quality product.

6. Market

Tiles made in this way are as strong as concrete paving tiles. If you can have your product tested and certified as an approved construction product, you will be able to market it to local building companies as well as directly to customers.

Figure 6: Example pages from *Making Waste Work*, 8: How to transform plastic waste into paving tiles.