



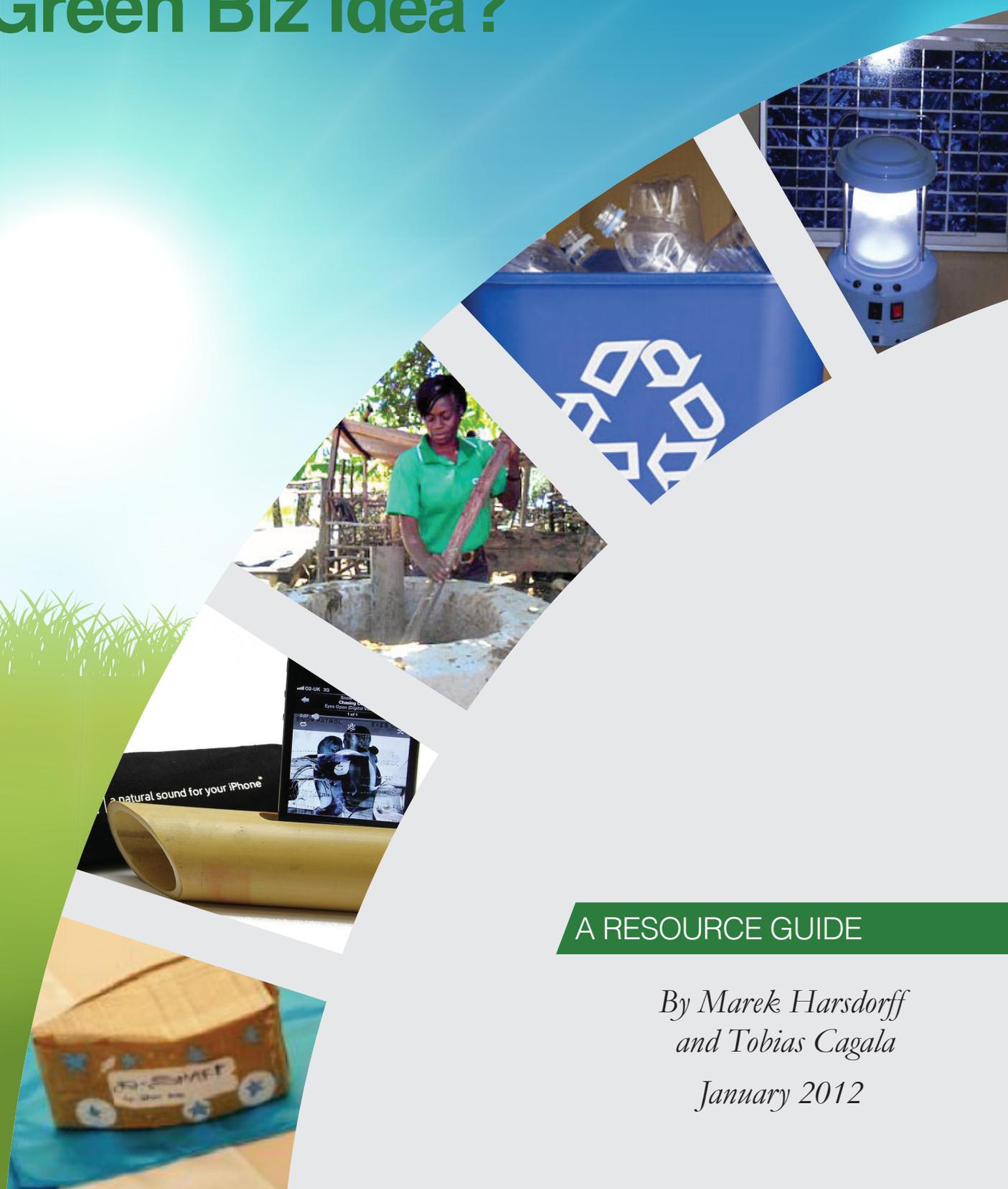
International
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Green Jobs Program



Are you in search of a Green Biz idea?



A RESOURCE GUIDE

*By Marek Harsdorff
and Tobias Cagala*

January 2012

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1. Introduction



This manual aims to be a practical guide with useful information for entrepreneurs, who are willing to start a green business. It is structured in the following way:

- Firstly, it offers a short explanation of available green technologies and green services that make business sense.
- Secondly, it outlines the types of skills and expertise needed to start a business in the identified green technologies and services, also identifying the specific professions/occupations required.
- Finally, it provides an internet link for further practical research and information.

Consequently, this guide is divided into sectors, in which Green Business can be created. Each sector is dealt with separately in the following chapters:

1. Renewable energy
2. Agriculture, forestry and fisheries
3. Waste management and recycling
4. Construction
5. Nature and eco-tourism
6. Efficiency technologies for energy, material and water

The most extensive information about the different types of green technologies and green business opportunities across all sectors can be found under:

<http://www.afrigadget.com/>

<http://www.appropedia.org/>

<http://climatetechwiki.org/browse/technology/b>

<http://www.tech-action.org/resources.htm>

A directory for “green” companies can be found under:

<http://www.eco-web.com/ini/index.html>

2. Renewable Energy



2.1 | Improved Cooking Stoves

To prevail over the Three Stone Fire, the Improved Cooking Stove reduces the use of fuel, saves cooking time (increasing efficiency), and creates a smokeless environment in the kitchen and/or reduces the amount of smoke emissions.

There are two major types of stoves, the 'portable stove' you can buy from the shelf and the 'fixed stove' which is installed in a building, for example households, schools and health centres. See pictures.



Cost

Stove prices vary depending on the stove type and design. There are some improved portable cooking stoves that can cost as little as 5 US\$, while other models may cost closer to 50 US\$ (probably not the best value for money). The prices for some large, fixed community stoves can even exceed 50 dollars.

Source: <http://energy.invisibleschoolhouse.net/mod/wiki/view.php?id=159&page=ImprovedCookstoves>



Types of business

Improved cooking stoves can be manufactured locally out of clay and/or iron (**manufacturing business**). Although some technical skills and experience are necessary, they can be obtained in training courses. Clay stoves require a furnace, which can also be built locally. The iron used in the manufacturing process needs some welding. The advantage is that the manufacturing business can be located in rural areas where the demand is high and local materials can be used. In addition, the business can quickly be moved to other locations where a high demand for stoves is identified.

The stove manufacturing business also needs **marketing and retail businesses**. These businesses need to have a good knowledge on the technical details and advantages (economics in the use of wood fuel, how to use the stove, details about smo-

ke emissions, stove lifetime etc.), and appropriate shops and outreach capacities to reach out to remote rural areas where the demand is highest.

The improved cooking stoves are eligible for international carbon credits. This means that each stove can receive between 3-10 USD of 'credits' from international buyers. Specialized **carbon credit consultancies** can offer their services of clustering improved stove builders and retailers, develop bundled projects, monitor the quantities of stoves and their usage during their lifetime, and sell the credits to the international market.

Additional Information:

http://www.appropedia.org/Improved_stoves

<http://www.hedon.info/Improvedcookstove>

http://en.openei.org/wiki/Main_Page

<http://www.renewableenergyworld.com/rea/home>

2.2 | Portable Solar Photovoltaic (PV) Appliances (2-12 Watt) for Lighting and Cellular Phone Charging

Portable solar systems usually consist of a solar panel, a lantern with an LED (Light Emitting Diode) or Compact Fluorescent Light (CFL) and in-built battery. Other portable products are solar cell phone chargers (only panel and adapter) and radios (radio and / or panel). These small systems are compact, affordable, and ideal for rural environments.

Cost

Commercial retail prices for portable solar appliances vary between 20 and over 100 US\$, depending on the product type and quality. Compared to conventional installed solar 'home systems', these products have multiple advantages.

Source: <http://www.hedon.info/article1898>



Types of business

Manufacturing and assembly businesses for lanterns and ICT charging devices make business sense only in large scale (e.g. manufacturing 1.5 million a year) because of economies of scale that exist in China and India. Accordingly, **retail, operation and maintenance as well as service** businesses are more appropriate for small start-ups considering portable solar products.

Retail and service businesses require a store or a shop. These types of businesses need to establish a reliable supply chain through contacts to a production company or grocery store, where clients can buy the products from. In order to reach out to the market, particularly to un-electrified remote areas, a mode of transport is needed as well. High technical knowledge of the lanterns is crucial, as a lot of low quality and fake products and brands exist which would spoil the

business. Businesses with a comparative advantage in this market are 'flying solar dealers', reaching out where the market demand is, together with solar shops and maintenance technicians. Another type of business profitable in this area is the service of selling only the 'light'. For example in a village an entrepreneur buys 20 lanterns himself, brings the lanterns to households in the evening, collects them in the morning to charge them in the business premises in order to bring them back in the evening, thus selling 'light' every day. These business models are viable, as this type of light is often cheaper than kerosene.

More information

<http://www.greenlightplanet.com/>

<http://www.afrigadget.com/2009/09/05/a-wearable-flexible-solar-panel-idea/>

<http://iapnews.files.wordpress.com/2010/03/lighting-vanuatu.pdf>



2.3 | Solar Home Systems

Solar home systems are solar panels (photovoltaic panels called PV) fixed on the top of the roof to supply a house, school or health centre with electricity. The system contains panels, battery, wires, charge controller and applications such as converters to transform direct current (DC) into alternating current (AC) - often needed for TVs and productive equipment -, light bulbs and fridges. Solar home systems are mostly not

connected to the grid and allow for rural electrification where there is none. The panels range from 30 Watts, just enough to power up some lights, up to over 100 watts, enough for a TV and cell phone charging business.

Installing a solar energy system is often cheaper than laying electricity cables to the grid which can be very far. Often the alternative is a generator, but it needs fuel each time it is being operated, and in the long run



it is much more expensive to use. Spare power from the solar panels is stored in a battery for use during times where there is no sunshine in the day, as well as during night time.

Total cost of Solar Home Systems in Uganda sold by UltraTec (U) Ltd:

- 100 USD for a 10 watt system (power for only 2 lights and one cell phone)
- 750 USD for a 100 watt system (power sufficient for TV, small fridge, lighting 5 rooms and charging 2-3 cell phones a day)

<http://www.bba-uganda.org/Ultratec.htm>

Types of business

Solar panels, solar batteries, charge controllers, wiring and equipment powered by solar systems (bulbs, fridges, radios, TVs, inverters etc.) need to be imported, as most products are manufactured in the US, EU, China or India. Only few of these products are locally procured from the few local producers. Once imported or produced, the products need to be retailed through shops. Shop assistants and owners need very detailed technical information to inform the customer on how best to suit the actual needs. As

a next step, the system needs to be designed, installed as well as maintained by trained technicians. Entrepreneurs could themselves invest into a solar home system to use the electricity for a cell phone charging business, for water pumping and irrigation, sale of cold drinks etc.

More Information

<http://www.residentialpanels.org/solar-power-ebook-2>

<http://www.ashdenawards.org/solar>

2.4 | Micro Hydro

The term *small hydropower* in this publication refers to hydroelectric power plants below 10MW installed capacity, already enough to equip a small village with lighting. Hydroelectric power plants are power plants that produce electrical energy by driving turbines and generators as a result of gravitational force of falling or flowing water. Through the natural water cycle, mainly evaporation, wind and rain, the water is then brought back to its original height. Hydroelectric power is thus a renewable form of energy. Small-scale hydro power may be a useful source for electrification of isolated sites and may also provide an extra contribution to national electrical production for peak demand.

Building a small-scale hydro-power system can cost from 1,000 to 20,000 US\$, depending on the site elec-





tricity requirements and location. Maintenance fees are relatively small in comparison to other technologies.

Source: http://practicalaction.org/micro_hydro_expertise

More Information

<http://www.microhydropower.net/index.php>

<http://tech.groups.yahoo.com/group/microhydro/>

<http://www.energyalternatives.ca/Downloads/MicroHydroCalc.exe>

http://www.energyplanet.info/Micro_Hydro/



2.5 | Pico Hydro

Pico hydro is a term used for hydroelectric power generation of under 5 kW. This type of power generation is useful in small, remote communities that require only a small amount of electricity - for example to power one or two fluorescent light bulbs and a TV or radio in 50 or so homes. Even smaller turbines of 200-300W may power a single home in a developing country with a drop of only 1 meter. Pico-hydro set-ups are typically run-of-stream, meaning that dams are not used, but rather pipes divert some of the flow, drop this down a gradient, and through the turbine before being exhausted back to the stream.

Costs vary depending on the Power of the facility. Total fixed costs for installation and construction of a 300W facility are approximately 726 US\$.

Source: http://www.openelectrical.org/wiki/index.php?title=Pico_Hydro_Cost_Estimate

Types of business

Investing in a pico- or micro-hydro utility costs a substantial amount of money, and needs very good engineering skills. Micro hydro is very labour-intensive, and good management skills as well as good relations with the target communities are also required. Successful businesses can be created

as community enterprises or cooperatives to jointly invest in a hydro plant. Notably cooperatives can leverage the needed investment and labour, as well



as the buy-in of communities. Manager, engineer and technician are the core occupations needed together with a fee collector and marketing agent. Businesses that use the electricity in a productive way can be created after rural electrification.

More Information

<http://www.picohydro.org.uk/>

<http://www.youtube.com/watch?v=vPIPge1d7AA>

2.6 | Micro Wind

Wind turbines do not have to be enormous like those of large utilities found on windy hilltops or on cliffs beside the sea. In recent years, mini wind turbines have become more and more popular. Sitting atop a 5+ meter pole in the garden or near farm houses and

barns, a mini wind turbine generates a couple of kW of electricity power. Mini wind turbines are most common where the national grid electricity does not reach (off grid). The generated power is stored in battery banks and passed through inverters to produce 240AC electricity.



The price of micro wind turbines ranges from 600 US\$ to 30 000 US\$. A micro wind turbine priced at 600 US\$ with a capacity rated at 400 watts starts at an 8 mph wind speed. It produces 38 kilowatts each month turning at 12 mph. Micro turbines last up to 20 years.

Source: <http://www.doityourself.com/stry/micro-wind-turbines-cost-vs-savings>

Types of Business

Although micro wind turbines can be manufactured locally, a specialized engineer and a skilled technician are required to initiate and manage the process. Further, the market might be small, and it is th-

erefore necessary to first do research on the location and the wind speed available. In case there are already wind parks in the area, one might consider becoming a wind turbine technician, consultant or developer. Becoming an investor

into wind turbine manufacturing or installation requires a lot of expertise and would rather suit joint ventures or corporations.

More Information

<http://microwindturbine.alternativeenergyguru.com/>



2.7 | Biogas

Generally biogas refers to gas, which is produced by the biological breakdown of organic substance in the absence of oxygen (anaerobic digestion). Biogas originates from organic substance and is a type of biofuel. One type of biogas is produced by anaerobic digestion or fermentation of biodegradable materials, such as biomass, manure or sewage, municipal and human waste. Typically a small installation of 2 metric cubes (m³) is filled with manure of 2-4 cows per day (40-50 kg) and produces enough energy to provide for the daily cooking of a family. The manure, biomass or waste is fed into a concrete, air-tight digester and fermented. The by-products of the process are biogas and a fertilizer which is used in agriculture. There are three main types of bio digesters:

1. The tubular plant, which is basically made of a plastic or rubber bag, which expands while storing the gas.
2. The floating drum, in which biogas is collected in a metal gas holder, which rises according to the

volume of gas.

3. The fixed dome biogas plant, which is often the preferred option, as it requires masonry skills only, lasts longer (30 to 50 years), and is cheaper than the floating drum, since it accumulates less maintenance costs.

Another principal type of biogas is wood gas, which is created by gasification of wood or other biomass.

Biogas can be used as a low-cost fuel in any country and for any heating purposes, for instance for cooking. Biogas can also be used in generators to produce electricity or mechanical power.

In India, the cost of building a functional small biogas plant (2m³) amounts to around 300 US\$. In Tanzania, the materials for a simple facility cost only 70 US\$.

<http://www.snvworld.org/en/ourwork/Pages/Renewable%20Energy.aspx>

http://www.snvworld.org/en/ourwork/Pages/Africa_Biogas_Partnership_Programme.aspx

Types of Business

Biogas is becoming increasingly popular in rural areas where agricultural activity is enabling the production of biogas. Nevertheless, biogas installations have become more common also in urban centers, where municipal and human waste is collected and used to produce energy and fertilizer relatively cheaply. There are several types of businesses involved. A biogas service

company can be established to consult, design, plan and oversee the installation of small biogas plants. Concerning occupational categories, engineers are needed to design the system to make its size correspond to the amount of manure and organic waste available. Masons or technicians are needed to build the plant, as well as to operate and maintain it. Another possible business would be to invest in a larger plant and sell biogas and slurry as fertilizer.



More Information

<http://wildaboutafrica.wordpress.com/category/biogas/>

http://practicalaction.org/practicalanswers/product_info.php?products_id=42



2.8 | Eco-charcoal

Eco-charcoal is charcoal out of agricultural waste. Eco-charcoal is produced in the same way as charcoal, but using only waste material, such as kitchen waste. The product lasts longer and is cheaper than conventional coal.

Eco-charcoal can be produced in the same way as conventional charcoal at no capital cost. Only organic waste is needed to make the right mix of moist and dry substance. However, considering that charcoal powder often is the outcome of carbonizing organic waste, a manual or electric compressing machine is required – a manual one at 100 USD and an electric one for 1000 USD. For the carbonization, an efficient and affordable retort–kiln called ICPS (Improved Charcoal Produc-

tion System or “adam-retort”) can be built by a team of two trained workers within a week for about 300 USD. The investment recoup period for the device is about 5 months. The unit was developed in Burundi, East Africa and in India.



Source: http://www.tradeput.com/item_63765197_chine_YYCB116_0086_13643710254.html
http://www.odamindia.org/wp-content/uploads/2010/04/improved_charcoal_production_2009.pdf

Types of Business

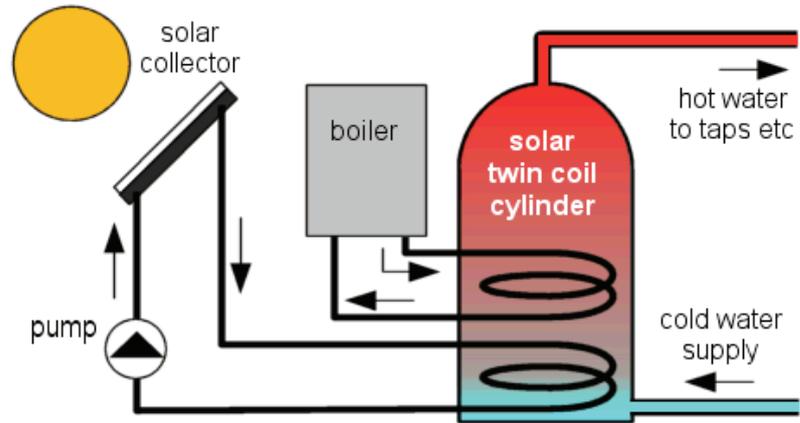
Many rural families around the world are charcoal businesses, as they produce charcoal and sell it to urban centres, in which it is often the most prominent cooking energy. This type of business is becoming increasingly difficult, as forests are cut and hence wood becomes scarce. Switching to the production of eco-charcoal out of organic waste is simple, and

requires not much different skills than the regular charcoal production. One business idea is to establish a consultancy practice, which would provide consultants or trainers to train farmers in eco-production for a small fee. Another possibility is a business that produces eco-charcoal. Such a business could probably attract a better market, selling an environmentally friendly alternative

to charcoal. A marketing strategy will be needed for the enterprise. Further, good metal engineers could produce eco-charcoal compacting machines, for which welding and mechanical skills are required.

More Information

<http://www.off-grid.net/2009/07/15/eco-charcoal-ignites-us-soil-revolution/>



2.9 | Solar Water Heater

Solar water heaters — also called solar domestic hot water systems — can be a cost-effective way to generate hot water for households or even schools, health centres and official buildings. They can be used in any climate, and the fuel they use — sunshine — is free. Solar water heating systems include storage tanks and solar collectors. There are two types of solar water heating systems: active, which have circulating pumps and controls, and passive, which don't have these fea-

tures.

The cost of a simple solar water heater for households rises from approximately 100-150 US\$ going up to more than 1000 US\$ for larger and more sophisticated ones. Furthermore, when comparing solar water heating systems, installation and maintenance costs should also be taken account of. Often systems where the initial investment is small might cost more in maintenance fees in the long run. Source: http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=12910

Types of Business

Manufacturing solar water heaters is feasible also in a developing country context with a low industrialization rate. The technology is simple, and a good engineer could venture into a manufacturing business. However, the most common business type in this area is a service and installation company, which purchases the systems from abroad, advises custo-

mers on the size and product and does or oversees the installation. Other service businesses can be built around engineers who sell their service to design the system size and installations, and technicians and workers who sell their work to carry out the installation. Further, specialized businesses focus on after sales and troubleshooting services.

2.10 | Incentives to invest in Renewable Energy: Feed in Tariffs

Around the world, due to ever increasing prices for fossil fuels, governments try to promote investments in renewable energy sources. In concrete terms, governments incentivize renewable energies through direct capital subsidies or so called feed in tariffs: for a period guaranteed by law, typically 15-20 years, a producer of renewable energy receives a fixed subsidised price for each kW produced. This provides the investor with investment security, as the demand is secured for a long period of time, covering the payback.



More Information

www.globalfeedintariffs.com/

<http://www.irena.org/>

2.11 | Occupations in Renewable Energy

Occupation	Necessary Skills	More Information
Technician	Technology-specific skills for the construction and installation of the facility and/or its operation and maintenance, as well as manufacturing.	http://careers.stateuniversity.com/pages/283/Solar-Energy-Technician.html http://www.centralia.edu/coe/pdf/WindStandards.pdf
Engineer	An engineer typically works in the design and development of the facilities. S/he is therefore required to possess in-depth knowledge of the systems, tools and machines used for design and manufacturing.	http://renewableenergyengineering.com/
Consultant	Energy consultants need to be able to provide an array of services, information and expertise in the various aspects surrounding the use of natural energy sources, as well as the renewable energy financing options which may be available from the government or local authority.	http://www.ehow.com/how_2103050_start-renewable-energy-consulting-business.html
Retail, salesperson	Business skills and a good knowledge of the different renewable energy products	http://www.ehow.com/how_7238052_open-green-energy-store.html
Manufacturing	Depending on the position, technical skills for manual labour and advanced business skills for managers and investors	http://energy.sourceguides.com/businesses/byP/byProd.shtml



3. Agriculture



3.1 | Organic Fertilizers

An organic fertilizer is a soil amendment derived from natural sources providing, at least, the minimum percentages of nitrogen, phosphate and potassium for plants to grow. Organic fertilizer can be produced from plant and animal by-products such as manure, kitchen residues and seaweed.

Cost

Organic fertilizer costs around 0.05 US\$ per square meter per season. It is thus considerably cheaper than chemical fertilizers which cost around 0.15 US\$ per square meter per season.

Source: <http://www.best-organic-fertilizer.com/organic-fertilizer-vs-chemical-fertilizer.html>

Types of Business

Business options in this area come about either through the use of organic fertilizer for farming purposes, or its production and sales. Farmers willing to increase productivity can introduce fertilizers in their farms. Considering that the fertilizer in question is organic, the farmers may apply to be certified as a producer of organic food, for which a premium price is often paid, notably in export business, but if recognized nationally, also in the domestic markets. Further, several types of businesses can be created in producing organic fertilizer. The probably most common organic fertilizer producers base their production on compost, kitchen and garden waste, or animal manure. When producing organic fertilizer, a technique called vermin-compost can be used. Vermin are added to the decomposition process of the organic substance, catalysing the process and enriching the compost further.

More Information

<http://www.epa.gov/oecaagct/torg.html>

<http://www.youtube.com/watch?v=zA-NKD4Ra98>

3.2 | Organic Pesticides

Organic pesticides are made from organic chemicals found in the nature, or from micro-organisms/insects which naturally combat or 'eat' the insects or pests destroying plants. This new technique is called Integrated Pest Management (IPM).

Organic pesticides and IPM can allow farmers to control pests and diseases in plants without resorting to conventional pesticides. Low technology solutions, such as chilli and pepper, as well as high technology solutions, such as (IPM), are available in the market. This does not necessarily mean that organic pesticides are safer to use, but that they are often cheaper and easier for the nature to dispose of.



Cost

Costs for organic pesticides vary between 7 US\$ and 100 US\$ per One Acre Application, depending on the pesticide.

Source: http://www.ctahr.hawaii.edu/sustainag/news/articles/V5-CoxRadovich-org_pesticide.pdf

Types of Business

Looking at professions, a chemist and agronomist education give a good basis for starting a business in the production of organic pesticides or rearing micro-organisms for Integrated Pest Management (IPM). The rearing can easily be done locally and is not highly technology intensive, although professional equipment is required.

More Information

http://www.appropedia.org/Organic_pesticides

3.3 | Eco-Labeling and Export

Eco-labels, organic certification and green stickers are labelling systems for food and consumer products.

They are a sustainability measurement tool directed at consumers, intended to make it easy to take environmental concerns into account when shopping. Some labels quantify pollution or energy consumption by way of index scores or units of measurement; others simply

assure compliance with a set of practices or minimum requirements for sustainability or reduction of harm to the environment. Usually both precautionary principle and substitution principle are used when defining the rules for what products can be eco-labelled.

Costs for eco-labelling include on one hand the cost of compliance with the label standards, and on the other hand fees and other costs, depending on the label and product.

Types of Business

Organic labelling is attractive for farmers who are willing to engage with a certification institution to produce and sell certified products. Investments are required to access the label, although these costs are offset in the longer run through a higher guaranteed price for labelled products. Another business alternative in the area

of eco-labelling is a consultancy practice, selling expert advice to farmers on what rules and practices to pursue to access the label. Consultants working in this field should be knowledgeable about the standards and different labels as well as the organic farming practices.

More Information

<http://caelusconsulting.wordpress.com/2011/02/23/what-are-eco-labels/>

[com/2011/02/23/what-are-eco-labels/](http://caelusconsulting.wordpress.com/2011/02/23/what-are-eco-labels/)





3.4 | Water Harvesting and Drip Irrigation

Drip irrigation, also known as trickle irrigation or micro-irrigation, is an irrigation method which saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly in the root zone, through a network of valves, pipes, tubing, and emitters.

Water harvesting is as simple as building water cap-

ture tanks to store water in the rainy season, then to be used for irrigation in the dry season.

Cost

The cost for pre-packaged drip irrigation kits rises from around 15- 90 US\$ for a basic setup for a small area (approximately 100-250 square feet) to 100- 500 US\$ for a higher-quality, more complex kit that will water a larger area.

Source: <http://www.costhelper.com/cost/home-garden/drip-irrigation.html>

Types of Business

Farmers can use drip irrigation to increase productivity and to sow more frequently. Able agro-technicians and engineers can start a business in manufacturing, designing and installing drip irrigation systems, and constructing water harvesting systems.

More Information

http://en.wikipedia.org/wiki/Drip_irrigation
<http://www.irrigationtutorials.com/dripguide.htm>
http://www.treehugger.com/files/2006/12/the_hippo_water.php
<http://www.hipporoller.org/>
http://www.treehugger.com/files/2005/07/elephant_pump_w.php

3.5 | Forestry, Tree planting, Erosion Control and Soil Management

Erosion control is the practice of preventing or controlling wind or water erosion in agriculture, land development and construction. Effective erosion control is a central part of preventing water pollution and soil loss. A whole new green business is emerging in the field of carbon credits. Such credits, achievable through tree planting for example, can be sold on the international market.



Types of Business

Farmers or investors who have access to land may want to plant trees to sell wood and/or seedlings of specific trees. Carbon credits can be an additional source of income for such tree planting businesses. Consultants specialized in international carbon credits can open a consultancy to assess and submit carbon credit projects from wood businesses. Agricultural extension businesses can provide advice to farmers on soil erosion control measures.

More Information on Forestry

<http://www.proforest.net/projects/forest-and-trade-networks-africa-and-asia/>

http://www.ecs.co.sz/env_articles_soilerosion.htm

More Information on the Carbon Credit Project Cycle

<http://cdm.unfccc.int/Projects/diagram.html>
Project Design Guidelines

<http://cdm.unfccc.int/Reference/Guidclarif/pdd/index.html>

Project Documents to be filled in for a proposal

http://cdm.unfccc.int/Reference/PDDs_Forms/PDDs/index.html

Procedures

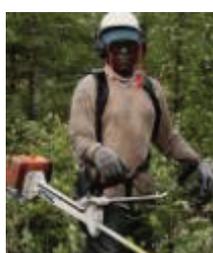
<http://cdm.unfccc.int/Reference/Procedures/index.html>

Accepted carbon projects (mostly in China, but also in Africa - see Kenya)

<http://cdm.unfccc.int/Projects/registered.html>

3.6 | Occupations in Agriculture and Forestry

Occupation	Necessary Skills	More Information
Organic Farmer	Organic farming requires a new way of thinking on food production. Instead of focusing on crop and animal yields only, organic farmers consider the entire agro eco-system.	http://www.slpsdi.com/vision.html http://orgprints.org/5161/3/parrot-et-al-2006-africa.pdf
Agronomist	Agronomists often specialize in a specific field. One area of work is growing plants without pesticides or chemical fertilizers on organic farms. Another possibility is to work in laboratories and experiment with new chemical pesticides and herbicides on test plants.	http://www.ncsu.edu/majors-careers/do_with_major_in/showmajor.php?id=84
Water technician	Technical skills for installation, operation and maintenance of water systems	http://www.ehow.com/about_6643639_job-description-on-water-technician.html
Consultant	Skills and knowledge required depend on the type of consultancy. Consultants can work as export advisors, organic labelling specialists, experts in the carbon credits market, and many more professions.	http://www.agri-africa.co.za/
Forestry workers and forest managers	Forestry workers work outside and carry out daily tasks related to reforestation and to the management, improvement and conservation of forest lands. They are employed by logging companies, contractors and government institutions.	http://www.mygates.ca/profiles/37forestry.html



4. Waste Management and Recycling



4.1 | Collection, Sorting and Retail

Every day around the world there are millions of tons of waste thrown away by households and enterprises. Most of this waste contains highly valuable raw materials such as plastic, paper, metals and glass as well as electronic waste, such as cell phones and computers. Waste can be either directly used to produce recycled items, or it can be processed into raw materials. Collecting, sorting and retailing these raw materials can

be developed into an increasingly profitable business, as raw material prices are soaring worldwide.†

Cost

Capital requirements are generally at a low level, and depend on the scale of the project. Importantly, companies operating in this area need to pay attention to the right type of safety and health equipment for waste collectors.



Types of Business

A common and profitable type of business in waste management and recycling is the formation of cooperatives in communities for waste collection or for sorting and treating waste from dumpsites. These types of businesses provide a secure income together with an organisational structure. The organisational structure is important for claiming rights and negotiating collectively with communities and dumpsite operators.

More Information

http://www.ilo.org/public/english/employment/recon/eiip/download/waste_recycle/business_manual.pdf

4.2 | Processing into Raw Materials and Products

One of the most important economic benefits of recycling comes from the production and sales of new resources. Recycling includes the processing of used raw materials into new products or into raw materials for other products. Recycling will avoid waste of useful materials, reduce the consumption of new raw materials, cut down on energy usage and also reduce air and water pollution.

Cost

Costs can include licences and fees, land, construction costs, equipment costs and funds for the period of initial operations. These costs will be determined by the nature of the business, the location and the type of equipment that will be used.

Source: <http://www.calrecycle.ca.gov/BevContainer/Recyclers/StartBiz.pdf>



Types of Business

There are many business opportunities in processing waste. Glass can be crushed into cullet ready to be remelted. Used paper can be processed into pulp, the raw material for new paper, through mixing it with water and chemicals, and chopping and heating it. Steel and aluminium are cheaper to recycle than to mine iron ore and bauxite. Steel and aluminium do not

lose any of their inherent physical characteristics during the melting process. Thus recycling drastically reduces energy and material requirements compared with refinement of the products from ores. Plastic can similarly be shredded and sold as raw material, or heated and the semi-liquid mass pressed into new forms such as poles. Electronic equipment, such as computers and cell phones, contain precious

metals such as copper, cobalt, zinc, gold and silver, which can be recovered. However, recovering those metals requires good technical knowledge as well as appropriate equipment to safeguard the safety and health of workers.

More Information

<http://www.calrecycle.ca.gov/Bev-Container/Recyclers/StartBiz.pdf>

<http://www.bwmaterialsinc.com/>

4.3 | Production of Handicraft and Consumer Goods

Waste generated by the society, with the creativity and innovation of business, can be recycled and turned into new products which have higher economic value. Organic waste, such as wood, leaves, egg shells and animal bones, can be recycled and processed into a variety of unique crafts work or processed into compost. Non-organic waste, such as plastic, glass, rubber and metal, can be recycled into goods.



Types of Business

There are no limits to creativity as concerns starting a business based on exploiting waste. Plastic and old clothes can be used for baskets and handbags; rubber and tires can be used for shoes and plant pots; wood and cardboard for shelves and furniture, etc.

More Information

<http://twitteling.com/2011/01/creative-business-opportunities-recycling-waste/>
<http://www.mixph.com/2010/11/guide-to-starting-a-handicraft-business.html>
<http://wwwx.spc.int/coastfish/sections/community/english/publications/smallbusiness.pdf>

4.4 | Transforming Organic Waste into Energy and Fertilizer

Organic waste resources, such as animal dung, animal urine, bone meals, slaughter house wastes, crop residues, oil cakes, urban garbage, sewage/sullage effluent, etc., provide a vast potential for exploitation.. Much of this organic waste remains unutilized, leaving enormous scope for development of organic manures through recycling.

Cost

For large scale projects, logistics and transportation aspects of the waste-to-energy value chain present considerable challenges both in terms of operations as well as costs.

Organic fertilizers can also be produced at a low cost by simply collecting the organic material, shredding it up, piling it up, and letting the nature take its course.

Source: http://www.altprofits.com/ref/ct/ctv/eg/waste_to_energy.html

<http://www.squidoo.com/low-cost-rapid-organic-waste-to-organic-fertilizer-conversion>



Types of Business

A simple business format for an entrepreneur would be to rent a plot of land, collect organic and animal waste and produce it to organic substance. The energy value of the organic matter can be increased by

adding vermin to it, producing vermin compost which can even be dried and packed.

More Information

http://www.ehow.com/way_5584500_organic-fertilizer-instructions.html

5. Construction



5.1 | Natural Building Materials

Clay and sand provide an alternative to cement materials commonly used in buildings. Clay or sand is first mixed with water and straw or another fibre, or as little as 5% cement, then sun dried or compressed to form cob or adobe (clay blocks). Other materials commonly used in natural building are earth (as rammed earth or earth bag), wood (cordwood or timber frame/post-and-beam), straw, rice-hulls, bamboo and rock. A wide variety of re-used or recycled materials could also be used in natural building, including urbanite (salvaged chunks of used concrete), tires, tire bales, discarded bottles and other recycled glass.



Cost

The cost of natural building materials varies greatly depending on the material as well as its origin. In general, simple local materials, such as compressed earth blocks, can be very affordable. Research done in Zambia shows that compressed earth blocks are 50% cheaper as building materials than cement. In addition, the thermal insulation is 10 times higher, and the stability greater due to the compactness of the blocks.

Source: <http://www.greenhomebuilding.com/QandA/natural/cost.htm>

More Information

<http://dsc.discovery.com/tv-shows/curiosity/topic-s/10-natural-building-materials.htm>

5.2 | Energy-efficient Construction Techniques

To increase the insulation and energy efficiency of the building envelope (the barrier between conditioned and unconditioned space), it is possible to use high-efficiency windows and insulation in walls, ceilings, and floors. Another strategy, passive solar building design, is often implemented in low-energy homes. Designers position windows and walls in an energy-saving manner, and place awnings, porches and trees to shade windows and roofs during the Summer, while maximizing solar gain in the Winter. In addition, effective window placement (day lighting) can provide more natural light and lessen the need for electric lighting during the day. Compressed earth blocks are also very good insulators.



More Information

http://www.scp-centre.org/fileadmin/content/files/4_projects/24_Africa_Marrakech_Task_Force/SBC_BriefBook_Gesamt_reduced.pdf
http://www.neo.ne.gov/home_const/factsheets/effic_design_and_const.htm

5.3 | Occupations in Eco-Construction

Occupation	Necessary Skills	More Information
Manufacturer of building materials	Good knowledge on properties and on the utilization of natural building materials, as well as technical knowledge on how to produce them	http://www.calrecycle.ca.gov/greenbuilding/materials/
Retailers and suppliers	Business skills in running a business of green building materials, recycled materials or handcraft items	http://www.greenbusinessguide.co.za/green-pages-2/materials/
Engineer	An engineer typically works in the design and development of machinery and techniques used for making the materials, as well as for recycling or improving energy efficiency. In-depth knowledge of the systems, tools and machines used for design and manufacturing is needed.	http://www.ehow.com/video_5113347_environmental-engineering_.html
Architect	An architect needs to be familiar with green building practices and their application to building projects.	http://www.earthtemple.co.za/
Construction worker	Apart from technical skills, a construction worker should possess basic knowledge about sustainable building materials and energy efficiency.	
Recycling Specialist	Sound knowledge about the whole recycling process and related business opportunities.	http://www.recyclingspecialist-sinc.com/



6. Ecotourism and Nature-based tourism



6.1 | Tour Provider

Ecotourism is about tourism with a minimal impact on the environment. Tourists are increasingly willing to pay for holidays which they know will not harm the environment. This demand from tourists can be turned into a business by tour operators offering eco-tours. In addition to minimizing the environmental harm of tourism, ecotourism providers can benefit from the untouched beauty of the nature, for which travellers are increasingly willing to pay as well. Tour operators can offer tourists an array of services from organizing environmentally friendly homestays and hotels to organic restoration and nature tours to forests, mountains,

deserts etc. so as to discover natural habitats, animals, biodiversity and local culture. Travellers are willing to pay for learning about the specific spot in question, the environment, and the community, and how activities are undertaken there in harmony with nature.

More Information

<http://www.green-business.co.uk/>

<http://www.travelocity.com/TravelForGood/gr-directory.html>

<http://greenglobe.com/>

<http://www.piedrablanca.org/ecotourism-definition.htm>

6.2 | Environmentally-friendly Hotels and Homestays

An eco-hotel or homestay is a hotel or accommodation that has made important environmental improvements to its structure in order to minimize its impact on the environment. Typically a hotel applies highly efficient standards on the use of energy and water, as well as technologies such as double glass window insulation, efficient light bulbs, solar water heater systems and recycling facilities. Environmentally friendly homestays - which some tourists are looking for - often offer very rudimentary services, such as accommodation in traditional clay houses, local food, no package waste etc. Certifying a hotel or homestay with labels such as Green Globe offers market opportunities in eco-tourism.

More Information

<http://greenhotels.com/index.php>

http://en.wikipedia.org/wiki/Eco_hotel

<http://greenglobe.com/>



6.3 | Organic and Local Food Sellers and Restaurants

Tourists travelling long distances from home increasingly wish to discover natural integrity combined with local culture. To experience local food, which is traditionally made and free from additives, pesticides

and chemical fertilizers, is part of most tourists' holiday wish list. Local food sellers, bars and restaurants that supply themselves with naturally grown produce and offer locally made meals and drinks could gain a market advantage over conventional restoration in hosting tourists.

6.4 | Occupations in Eco-Tourism

Occupation	Necessary Skills	More Information
Tour Operator	Tour operators devise, arrange and promote holiday and travel products to customers. This promotion is either done through travel agencies or directly to the customer by means of brochures or websites. The operator needs to have good language as well as business skills. In the case of eco-tourism, also knowledge about sustainable tourism is necessary.	http://www.ecotourdirectory.com/ http://en.wikipedia.org/wiki/Eco-tourism
Tour Guide	Language skills; knowledge about the route to be covered and its features or attractions; knowledge about culture, history, society, geography, flora and fauna; research skills for collecting information for the purposes of the tour, knowledge about how to run tours with minimal impact on the environment; planning, organisational and time management skills.	http://factoidz.com/how-to-become-an-ecotourism-guide/
Eco-hotel or lodge owner	Hotel owners need knowledge about green construction and energy, and on water saving equipment; as well as green operation skills	http://www.wikihow.com/Create-a-Green-Hotel
Food seller, bar and restaurant owner	Bar and restaurant owners need to know about organic food supply and traditional ways of preparing food and beverages, as well as good marketing skills to attract tourists to their restaurants and bars.	http://en.wikibooks.org/wiki/Organic_Business_Guide



7. Energy, Water and Material Efficiency in all types of Enterprises



environmental accounting, metering and cleaner production practices to investment into energy efficient light bulbs, water flow regulators and energy efficient machines and appliances.

All enterprises in one way or another depend on energy, water and materials as input in their business. As energy and material inputs represent an important part of the total production cost, enterprises which reduce their input through efficiency strategies can cut costs and increase profits. Energy, water and material efficient technologies and practices range from behavioural change,

Cost

Costs to start a business in energy, water or material efficiency varies greatly. Street sellers of efficient light bulbs require very little investment, whereas energy service companies improving efficiency of other companies might need thousands of dollars to pay for the initial investment.

Types of Business

Energy, water and material specialists can help enterprises to become more efficient. Notably consultants and engineers in cleaner production and 3R strategies (reducing, re-using and recycling) can make a business by offering their auditing services to companies. An emerging business has been created by energy service companies which invest in energy efficiency measures in all types of companies on the basis of getting paid by the energy savings of companies. As the payback period for energy-efficient investments is often around a year, profits can be made even short term.

More Information

<http://www.unido.org/index.php?id=o5133>

<http://www1.eere.energy.gov/buildings/technologies.html>

<http://sustainablesources.com/>

