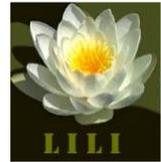




# pedal-powered generators



*a pedal-powered generator stand onto which you can fix your bicycle to generate electricity; after you've finished, just unfix the bicycle and ride away*

## what are they?

Pedal/bike generators are mini-power stations, that allow you to convert human effort into electricity. They have been around since at least the early 1900s, when they were used during WWI to power field radio equipment.

You can use a regular bicycle with a generator on a modified training stand (used by cyclists for indoor exercise during the winter). The stand is adapted by replacing the resistance unit (the bit that makes you feel like you're cycling on the road) with a plate on which a generator is fixed. When pedalling you spin your bike wheel, which spins a roller, and in turn spins a series of magnets in a motor that creates an electromagnetic charge.

It's like a large dynamo (in other words, a motor running backwards is a generator). The generator will produce direct current (DC) – the type of electricity produced by renewable electricity systems or stored in batteries (the other type of current is AC, or alternating current - i.e. mains electricity).

But a DC current is 'spiky' - depending on how hard you pedal, you create different voltages (resulting in very jerky electricity) - anything between 0-60 Volts. Most DC appliances (typically used in caravans or boats) need a smooth 12V, so the voltage needs to be regulated. A regulator can be included in a DC system, and can be set from 0-30V depending on what you're trying to power.

So let's say the voltage is set via the regulator to 12V. You can plug in a 12V appliance, pedal

away and power it in real time with no battery storage. Or, you could connect an inverter that would allow you to power standard 240V household appliances. Pedal-powered generators can also be used to charge batteries, so that the energy can be stored for later.

Sometimes you don't need to generate electricity at all. For example, you couldn't pedal hard enough to generate enough electricity to power a 600W blender in real time. But you could work the blender directly via a roller on the wheel, connected to the drive shaft with the blender blade on. There are washing machines run directly from pedal power, and even a Scalextric track.

## what are the benefits?

- good exercise – but even better, you don't waste your energy. On a stationary exercise bike all the energy produced is simply wasted as heat. Replace the resistance unit with a generator and you can power the TV or radio as you are cycling
- which saves money, obviously
- and it saves all the carbon emissions and pollution associated with the electricity generation that you've avoided
- it's educational, and can be used by teachers and campaigners to explain electrical and mechanical, as well as environmental topics
- it raises awareness, and helps people question their electricity usage, and the wattage of their appliances
- very useful in remote situations, or for emergency backup, as it doesn't rely on the sun or the wind – just on you and a bike
- easily transportable and storable



*cycle-powered cinema at a festival in London*



- good for public participation, especially when several bikes are connected together, as you might have seen at festivals
- festivals! 1 bicycle can easily power 1000 LED lights, creating an impressive display, or an amp / mike for a singer with a guitar entertaining 50 people. And obviously, the more bikes connected, the bigger light display or sound system can be powered

## what can I do?

A person with an average level of fitness can generate around 50W consistently for an hour or so – but obviously it depends on how fit that person is and how good your bike is. So if you have a 50W TV you could power that directly. You can check the wattage of your appliances by looking for a sticker on the bottom or back of them. A fit (every day) cyclist may generate an average of 70W for an hour, and 160W in short bursts; and a Tour de France rider can sustain approximately 400W, or up to 1kW peaks! You can power all sorts of things. For an average person, powering a radio is very easy - as is charging your laptop. One person could charge 15 mobiles at the same time. You could run a small stereo, three or four energy-saving light bulbs or a small LED projector with one bicycle. You can power all these things directly, or you could charge a battery. A 12V leisure battery (used in caravans) is better, and a deep-cycle battery is best of all as it can be discharged more often and more deeply. You can connect an inverter to the battery if you want to power 240V appliances.

You can buy a pedal-powered generator, or make one. It depends on you – are you a DIY person or not? Do you know something about electrics? There are several options to suit all:

- make the entire generator yourself from recycled parts, if you know how
- buy a generator and a stand
- buy a generator and fix it to a stand you've already got for exercising
- put together a DIY DC or AC (mains) kit to use with your generator
- buy a resistance unit to go with your



*testing a basic, home-made pedal-powered generator by lighting a bulb directly*

generator, which contains both the DC and AC kit – then you can just plug anything you like into it and away you go

NB:

- you'll get better results (i.e. more power) with a road bike with smooth tyres rather than a mountain bike or a bike with chunky tyres
- several bikes can be connected together to power larger appliances or systems
- you can use pedal-power in combination with other renewable generation, for example solar

## resources

- LILI (see below) for courses, information, links, books, products and forum
- Magnificent Revolution - cycle cinema, courses - [magnificentrevolution.org](http://magnificentrevolution.org)
- Tamara Dean, *The Human-powered Home*
- David Butcher: US site with tons of info - [los-gatos.ca.us/davidbu/pedgen.html](http://los-gatos.ca.us/davidbu/pedgen.html)
- Cycleclean: pedal-powered washing machine - [cycleclean.biz](http://cycleclean.biz)
- [pedalpowergenerator.com](http://pedalpowergenerator.com) - free DIY plans
- DIY Information: US site with information on how to make bike generators - [c-realevents.demon.co.uk/diystuff.html](http://c-realevents.demon.co.uk/diystuff.html)

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*Low-impact Living Initiative (LILI), Redfield Community, Winslow, Bucks, MK18 3LZ*  
**tel: +44 (0)1296 714184 email: [lili@lowimpact.org](mailto:lili@lowimpact.org) web: [lowimpact.org](http://lowimpact.org)**  
*Registered in England. Company Ltd. by Guarantee no: 420502*