The Oil Drum: Campfire

Discussions about Energy and Our Future

How to Set Up and Run a Bicycle Repair Company

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This is a guest post from Robin Lovelace (email: www (dot) lovelacerobin (at) yahoo (dot) com), a PhD student in energy research at the University of Sheffield, UK. Robin has recently set up RobRod's Repairs, a mobile bike repair business.

1. Introduction

Many of the articles that discuss the causes and effects of humanity's unprecedented energy use are entirely theoretical, offering little practical guidance for the everyday reader.

This essay offers respite to all the people who confront our collective energy problems with a furrowed brow and an expression that is puzzled by the continuous stream of theoretical insights that explain our current circumstances. This essay confronts our collective energy problems in more practical terms - with an adjustable spanner and a puncture repair kit at the very least.

Be the change poster seen on a bicycle in York

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2. Target audience

If you are young of heart and pioneering of spirit, this article is aimed at you. If you sometimes think about forming a small company in response to unprecedented global circumstances - the prospect of terminal declines in oil production and a changing climate - I suggest that you need to read this condensed chunk of knowledge, especially if you enjoy riding a bicycle and can operate a spanner.

3. Why should you set up a bicycle repair company?

Rich people (anyone earning more than $20,000 a year is rich, regardless of what their neighbours may think) burn ~200 kWh of primary chemical energy each day. Of this 70 kWh is converted into transport (MacKay, 2009: Chapter 3 and Chapter 5). (70 kWh equates to 30 miles in a 30 mpg car burning 40 kWh of gasoline and one long haul flight burning 30 kWh/day of kerosene, averaged over the year.) Conversion processes for transport include:

- Petrol exploding in an internal combustion engine's combustion chambers exerts a force on the pistons inside the bonnet of a car.
- Kerosene igniting inside a turbofan combustion chamber expands, spinning the jet turbines and thrusting the oxidised waste products out the back. For every 1 kg of fuel burned, a typical commercial jet engine produces 3.16 kg of CO_2, 10 g of NO_2, and 1-3.5 g of CO, all important greenhouse gases (Brasseur et al., 1998).
- Hydrogen molecules in natural gas (CH_4) react with nitrogen in the Haber-Bosch process, creating nitrate fertiliser that improves the yield of the world's industrial agricultural systems. The food derived from farming may eventually end up metabolized in a human body, in order to power leg muscles to walk or push pedals.

All of these processes depend on fossil fuels that are running out. Thus, a good reason to set up a bicycle repair company is that, despite the lengthy food chain, cycling is the most efficient of the above methods of converting fossil fuels into personal locomotion (especially if you eat well). A typical US car consumes 100 kWh of chemical energy per 100 passenger Km (24 miles per gallon), a plane 50 kWh and a bicycle 2.4 kWh – the bicycle is 50 times more efficient, ignoring the energy costs of production of the car or the food (MacKay, 2009, 2009).[1]

Another reason for setting up a bicycle repair company may be to make money. Cycling is a strong growth industry globally. There are more bikes than cars in the world and thousands of these cycles are sat in garages in various states of disrepair. Bike repair is labour intensive, uses few resources, and provides people with a new form of transport. If you are a bike mechanic and operate a fair business in your area, you may become a valued member of your local community, especially if fuel becomes scarce.

4. Why you should not set up a bicycle repair business

Before diving in, consider your circumstances and the nature of the local economy where you live. If the answer to the following questions is no, setting up a bicycle repair company may not be such a good idea:

- Is there demand for bike repairs in your area? (Test this by offering a 'Dr Bike' free session, or create demand through advertising/collaboration with local government)
- Can you fix bikes? (Put yourself to the test by fixing as many bikes as you can – fix those of friends, family and acquaintances; work/volunteer in a local bike shop; get an official qualification)
- Will you be offering something new in your area? (If there is already a good bike shop or mechanics – collaborate with them unless they are not interested)

Do not give up if you cannot say yes to all the questions. Bike repair should not be seen as a short-term money spinner like a trendy new Internet company during the dot-com boom. Bicycle repair is inevitably a social activity where you will slowly build up a network of friends and fellow cyclists who trust your abilities. But this growth will only occur in proportion with your bike repair skills: try to go too fast and you may have problems. Therefore when the answer to any of the questions is a 'maybe' instead of a definitive 'yes' perhaps you should consider abandoning the profit motive altogether, especially in the first few months or years. Remember, every time you look at a bike, or help someone else to fix one, you are gaining something priceless: important knowledge and skills that can be bought only with time. In my experience, the reward of fixing someone's bike for free is the satisfaction of providing them with increased independence from

cars, money and petroleum. An option I highly recommend is volunteering for a community bike project or helping an experienced bike mechanic – that way you will learn more quickly and support a good cause.

The altruism and goodwill mentioned above does not mean you should never make money from fixing bikes. By contrast, the warm glow generated from free repairs on both sides of the equation may become one of the central selling points of your business. You may also need money in order to invest in better tools and equipment. RobRod's repairs overcame this problem with a £500 grant from a small entrepreneurs organisation. This highlights the low startup costs of bike repair industries and the possibility of acquiring funding from sources acting in the public interest.

5. What you'll need

Tools are the most important work items a bike mechanic owns. Good tools will last decades, and it is possible to grow an affinity to tools that are used frequently. Low-quality tools can provide a cheap solution to infrequent problems, but may become a burden when they fail. For this reason, I recommend investing in high quality tools right from the beginning, as they will make bike repair more enjoyable. I have found it useful to divide my tools into two groups – one group I always bring with me, and another that I leave at home unless I know they will be used.

Frequently used tools, in rough order of frequency of use (Figure 1):

Allen keys (known as hex keys in the USA)
An adjustable spanner with a range up to 20mm +
Decent metal tire levers – could save you much time and effort
8 mm spanner – used frequently on older bikes
10 mm spanner – receives very frequent use
13 mm spanner – for adjusting seat height
15 mm spanner – the most common wheel nut size
15 mm pedal spanner – simple a thin, sturdy 15 mm spanner
Philips and flat-head screwdrivers – medium and small sizes
Pliers
Chain tool – essential for fixing chains
Spoke keys - 3.23 mm, 3.30 mm and 3.45 mm keys will fit practically all spoke nipples
15 mm and 17 mm cone spanners are frequently needed for hub servicing
Crank extractor
14 mm socket wrench
Cable cutters – essential for replacing worn cables
Plumber wrench or 30, 32, and 36 mm spanners for adjusting old headsets

Figure 1: Frequently used tools

Infrequently used tools, best used in a work shop:

Shimano freewheel and cassette removers (other, less commonly used removers exist)
Bottom bracket tool – for the Shimano 20 tooth BB cups common on newer bikes
Bottom bracket lockring
Hook spanner – for the majority of older BBs
Hack saw

Many specialized tools such as BB thread chaser, headset race hammer and truing jigs exist. Because of the cost of these tools, they are not accessible to most amateur bike mechanics. By working or volunteering in an established workshop, it may be possible to use these tools.

Along with the tools there are a number of items that are used in bicycle repair. These can be split into essential and useful items.

Essential items for basic bike maintenance:

- Lubricant is necessary to make bikes perform better. Mineral oil is the cheapest and most widely available lubricant. A few drops added to chains or oxidised cables can make a bicycle more pleasant to ride at virtually no cost. Grease is necessary for servicing hub, headset and and bottom-bracket bearings, although I rarely use grease for minor repairs. A light, squirtable lubricant is extremely useful for penetrating inaccessible components and removing handlebar grips.
- A high quality pump is essential for inflating tires to the correct pressure (40-80 psi is correct for most bikes, although one should always check the recommended pressure on the outer tire). As well as having gauges, track pumps require less effort to pump-up tires than do hand pumps.
- Puncture repair kits are crucial. There are many types on the market, and can be acquired

at low cost.
- Spare inner tubes – there comes a time when puncture repairs are no longer sufficient to fix a leaky inner tube. Presta (thin) and Schrader (thick) tires are the main categories, although many diameters and thicknesses are available

Other useful items:

- A bicycle work stand is near-essential if you do frequent repairs. Lightweight and compact models are available for the mobile bike mechanic.
- Spare inner cables – there are different types of both gear and brake cables, so make you get the right ones
- Spare outer cables – gear and brake cables are different. Buying in bulk (e.g. 30m) yields significant economies of scale and will allow you to share with buddies.
- Cable tidies – allow you to finish your cable repairs with a safe and attractive finish.
- Spare outer tires – will come in useful but are costly (if bought new) and bulky.
- Pannier racks and baskets – these can greatly increase the utility of a bicycle.

Figure 2. Items for bike maintenance

Figure 3: The whole mobile repair kit ready to go

6. How to set up

Setting up shop can be as simple as that. However, it is highly recommended that you get public liability insurance before doing repairs for people you do not know. Personal experience leads me to recommend keeping bureaucracy to a minimum in the early stages, although it may be necessary to keep detailed logs if the project grows into a full-scale company.

It is possible to set up shop just with a bike trailer, tools and a work stand, and preferably another bike mechanic for support. This was found to be an enjoyable and profitable option for RobRod's repairs when we would set-up on the University of York campus on sunny afternoons (Figures 4-7). Having a workshop as base of operations is highly desirable, but can be expensive. One solution is to work in collaboration with a local bike shop in the area, or to set up a bike co-operative if you have the time and experience. The potential to expand may grow as global oil production shrinks, but the key is to start small and master the art of walking before you begin to run.

Figure 4. RobRod's in operation on the University of York campus

Figure 5. Packing up shop after a hard day's work

Figure 6. The advantages of being a mobile mechanic: more business and more old bicycle donations

7. Conclusion

Bicycle repair is a practical activity that can empower individuals and communities to tackle energy-related problems with their own initiative and skill – without recourse to state intervention or mass social change. The increased usage of bikes that small-scale industries such as RobRod's Repairs induces is likely to lead to broader change relating to localisation and shifting attitudes towards energy and the local environment.

Figure 7. Be the change poster seen on a bicycle in York

Figure 8. Think outside the box

Appendix

The late Sheldon Brown has created the best website on bicycle repair available.
There are many second hand books available on bicycle repair on Amazon.
www.jakesbikes.co.uk is a bike business set up for the greater good; it inspired me to become an amateur bike mechanic.
Your best resource will be the real human beings who you work with to fix bikes.

[1] Even assuming the bicycle rider is powered by typical US food – an unhealthy choice requiring 10 units of fossil energy input for every one unit out (Pollan, 2006) – he would still consume 5 times less fossil energy per km travelled than the car driver. One could argue that the increased usage of a shower to cleanse the sweaty rider would offset this energy gain. However the argument is spurious for a number of reasons:

- Bicycle riders require less energy-intensive medical treatment.
- There are many hidden energy costs in driving, such as the production of the car, the urban sprawl that cars facilitate, the energy costs of road building, and economic power being inferred to those with a monopoly over private transportation.
- Bicycles put people in direct contact with their immediate surroundings, leading to a greater sense of community in areas with high numbers of cyclists. This may lead to economic regionalism and hence lower transportation costs in the area.