

I converted a cargo bike to an e-bike – here's what I learned

For about seven years in my 20s, in the midst of a crisis of self, I abandoned my nerdy predilections and picked up a new hobby, cycling, which ultimately turned into a lifestyle.

During what I now think of as my time in the wilderness, I sold my giant game console collection (I have regrets), stopped buying computers, got rid of my car, and quit my data aggregation job to become a pedicab driver – a gig job before gig jobs were cool – and eventually a guide at a small bike tour and rental company.

One of my duties between tours was bike maintenance, and our mechanic taught me some neat tricks like wheel truing and how to build a bike up. I would never call myself a bike mechanic, but it did make me comfortable wrenching on the basics.

One day, a retiree who liked showing off his toys brought in a Copenhagen Wheel – a self-contained e-bike kit that puts the batteries and motor all in the rear hub of the wheel. When he let me ride it, the little bit of extra acceleration in each pedal stroke flipped a switch in my skeptical brain.

A few years went by, and I ended up with my own e-bike. They're just so fun and convenient and may even fully or partially replace a car for some. They're certainly easier to park, making e-bikes perfect for quick jaunts. And if the battery runs out, well, you're still riding a (heavy) bicycle.

An electric *cargo* bike is an even better car replacement, but the good ones are so pricey that I never considered it. Never, that is, until an uncommon opportunity fell in my lap.

a: hover]: shadow-highlight-franklin dark: [>a: hover]: shadow-highlight-franklin [>a]: shadow-underline-black dark: [>a]: shadow-underline-white">The build

A few weeks ago, a friend of mine who works for a nonprofit bike company in Chicago called Working Bikes offered me a 1,000W Bafang motor in exchange for my partner's rarely used e-bike. I'd be able to convert the cargo bike she prefers to ride, and the shop would get something it could sell much easier. In my hubris, I thought this would be a two-hour job – boy, was that a deeply flawed assumption.

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a: hover]: text-black [>a: hover]: shadow-underline-black dark: [>a: hover]: text-gray-e9 dark: [>a: hover]: shadow-underline-gray-63 [>a]: shadow-underline-gray-13 dark: [>a]: shadow-underline-gray-63">Getting the motor in turned out to be pretty easy.

Securing the Bafang motor involves a small bracket, a locknut that requires a special wrench to tighten (the wrench usually comes with the conversion kit, but mine did not), and slipping an outer locknut over that. I didn't tighten the inner locknut enough, which made the motor all floppy when I first test-rode

the bike, so I had to go back and crank that down further.

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dark:[>a:hover]:text-gray-e9 dark:[>a:hover]:shadow-
underline-gray-63 [>a]:shadow-underline-gray-13
dark:[>a]:shadow-underline-gray-63">*The Luna display that
came with the motor.*

But hey, that's fine; I could still do some of the other work, such as swapping out the grips for the new ones (which included a twisting throttle) and putting on the display. This was easy enough – removing the old grips just required using a teeny tiny hexagonal wrench to loosen the minuscule bolts, keeping them snug, then slipping the new grips on, and the display simply clamps onto the handlebars and is secured with small bolts.

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dark:[>a:hover]:text-gray-e9 dark:[>a:hover]:shadow-
underline-gray-63 [>a]:shadow-underline-gray-13
dark:[>a]:shadow-underline-gray-63">*The battery still needs
to be replaced by something I trust, with more capacity.*

The battery ended up being another problem. See, I have no idea who makes it because the sticker on the side doesn't list a manufacturer, the battery pack capacity, or if it's been certified by a reputable safety lab. It's a smallish black box that's about three-quarters the width of a Nintendo GameCube and roughly the same height and depth. The bag it came with has velcro straps for attaching it to the frame, but they aren't long enough to work on the Xtracycle, which has wider-set, beefier seat stays than a normal bike.

I managed to get the battery bag to stay in place, but look at those straps straining to do their job. This isn't a permanent solution. Having a potential flamethrower from an unknown company (or e-bike-obsessed hobbyist) sitting under my butt isn't great, either, so I'll be replacing the battery soon.

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dark:[>a:hover]:text-gray-e9 dark:[>a:hover]:shadow-
underline-gray-63 [>a]:shadow-underline-gray-13
dark:[>a]:shadow-underline-gray-63">*It's alive! Minus some
minor changes later on.*

So the project is far from over, but I now have a techno cargo bike, and it works! The 1,000W motor has no trouble getting up to its roughly 30mph max in a hurry on throttle alone, and it's quiet getting there. That's a bit much for biking a kid around, though (not to mention technically illegal where I live), so I dropped the top speed down to 20mph in the controller's settings.

Pedal assist feels good, too, at least at the lowest setting – any higher, and it takes over a little too much for my liking. As with my other e-bike, I don't find myself using the throttle when I ride unless I want to get across a street quickly. The weak point in the system is definitely the battery, though – besides being unbranded and potentially unsafe, it's small and drains relatively quickly.

It could still use some wired lights, a new saddle, and wider handlebars with space for extra gizmos and storage galore so that we'll be that much closer to never, or almost never, needing to drive. Given that we've spent thousands of dollars keeping our two aging cars viable, that will be a dream fulfilled, indeed.

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dark:[>a]:shadow-underline-white">Lessons learned

Converting and upgrading a regular cargo bike into an e-bike left me with newfound respect for all the other DIYers upgrading their own bikes. I'm certainly no expert, and that's the point of sharing – any regular *Verge* reader can do this and benefit from my successes and failures.

Would I do it again? Yeah, I would. It was fun. But if you do your own conversion, it has to be because you really want to and you know what you're getting into. It might save you money, it might not – but the experience alone will be valuable.

In my case, the unexpected need for a new drivetrain and the labor to install it (my partner really wanted her bike back, and I didn't have the opportunity, knowledge, or tools to do it in a timely manner) added more to the cost of conversion than I had hoped. And I still have to replace the battery and chain ring.

Would I do it again? Yeah, I would. It was fun

Still, slapping a motor onto a popular, long-running bike brand means I didn't have to worry *quite* as much about the need for proprietary and costly parts (though cargo bikes certainly have their share of those). I recommend doing the same if you undertake your own conversion.

You can buy a kit with the same Bafang motor I used for under \$500 – but throw in a battery, and you're already looking at potentially doubling your cost. And if you find that you're uncomfortable with doing the work yourself or, worse – screw something up – then you have to pay your local bike shop a steep (and well-earned) hourly rate to install it or fix your mistakes. By the time you tally up all the conversion costs, you're inching into the same price territory as a good pre-built e-bike option from the likes of Yuba or Rad Power.

There's also the E-BIKE Act to consider. If it passes, it would offer a 30 percent tax credit (up to \$1,500) for e-bike purchases, making this kind of build for the dedicated few who just love a DIY project. Otherwise, a conversion might not be worth the effort if saving money is your primary motivator.

For me, the roughly 10 hours and about \$350 (plus the value of the old e-bike we traded for the motor) I've committed so far

to the conversion and component upgrades have been a worthwhile investment in the cargo bike and, importantly, *myself*. Now, when stuff breaks – and, inevitably, it will – I’ll likely be able to identify the failure and fix it, and there’s immense satisfaction in that.

All photography by Wes Davis / The Verge

<https://www.theverge.com/23817022/how-to-electric-bike-motor-conversion-bafang-cargo>