A Quiet Revolution in Bicycles: Recapturing a Role as Utilitarian People-Movers

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Bicycles were invented over 200 years ago and were used for many years as significant and efficient means of human transport. But over the past 40 years, bicycles lost their status in the US as human transportation vehicles, due to inexpensive oil and far-flung suburban development.
Since both of those factors favored automobile usage, the bicycle industry responded by refocusing their marketing strategy to promote bikes as recreational objects, only to be carted out on weekends and vacation time.

For many years this has been the status quo, with the typical bikes available in many bike shops catering to the weekend warrior, not the utilitarian cyclist. But in response to concerns over oil dependency and the environment, a quiet revolution started brewing in the mid-1990s that produced new bicycle designs and features, reinventing the bicycle as a significant mode of transportation. These new developments include cargo-carrying capacity for passengers and their stuff, plus compact, quiet, efficient, electric-assist motors that can extend the biker's traveling range and encourage biking more often.

This article is intended to provide a broad overview of the recent developments that make the bicycle a practical utilitarian vehicle for daily transportation. In Part 1, I introduce the concepts of cargo bicycles and electrical bicycles and address the question, “Why do these developments help make a bicycle a great personal transportation option for those concerned about Peak Energy?” Then, in the upcoming Part 2, I will get into the nitty-gritty details of the products and designs available, addressing the questions, “What are the features, how much do they cost, and where can I buy one?”
He started a revolution

In 1995, Ross Evans had just graduated from Stanford University. In his travels to Nicaragua, he noticed that people had a big problem: It was very difficult for them to transport their goods to market over long distances, often on narrow paths and over difficult terrain. He realized that this problem was a substantial impediment to the economic well-being of many small farmers and craftspeople, since it was difficult for them to connect their products with buyers. They could only carry limited amounts of goods by foot, and the trek would often take all day - which took a day away from their farming or craft.

Evans was an industrious fellow who was looking to use his engineering skills to do something positive for people in poorer parts of the world. He realized that the bicycle was a potential solution to the goods transportation problem, since it can very economically move people faster and farther than on foot. But existing bicycle designs were not amenable to carrying big loads over narrow footpaths. Most bikes designed for the recreational market had no cargo-carrying capacity to speak of. And the few cargo-oriented designs that existed at the time were generally three-wheelers (trikes) that were too big and bulky to travel on a footpath.

So Evans set out to transform the popular mountain-bike platform into a cargo- and passenger-carrying machine. The result was an invention called the Xtracycle Freeradical. His design took a standard fat-tire bike (mountain bike) and transformed it into a nimble, compact, cargo-carrying vehicle. It extended the bike’s wheelbase to provide a low, stable platform that would give the bike the ability to haul as much as 200 lbs. of things or people, without substantial negative effects on bike handling. The idea had an immediate impact, and it fostered development of programs like World Bike, which apply this long-tail bicycle concept to help people with inexpensive bikes (like this) across the developing world:

Bringing “long-tail” bikes to the US

After he invented the Xtracycle, Ross and his friend Kipchoge Spencer realized that this invention could be applied in the developed countries, like the US, to put a dent in all the problems created by over-reliance on cars, such as pollution, oil dependency, and an overweight populace. But this was the mid-1990’s USA, and due to the boom-time cheap-oil economy, their idea was about 10 years too early for widespread market acceptance.

Every innovation has its place and time. Some innovations happen before the market is ready for them and wither on the

vine. Others miss the boat, being too late. Ross Evans’ Xtracycle was in the right place and time to help people in poorer areas of the world make more practical use of a bicycle - especially if the only alternative is traveling on foot. But in the late 1990‘s, the richer countries weren’t ready for this kind of revolution. Steeped in historically cheap oil, a suburban housing boom, and a trend towards ever-bigger, gas-guzzling SUV’s, the Xtracycle was greeted with a bit of a collective yawn in places like the USA. While it did grow a small base of dedicated followers early on, it wasn’t yet going to inject itself into the mainstream, even among most bike aficionados. At the time, the aficionados only seemed interested in the latest mountain bike suspension technology or the latest racing part from Campongolo (a high-end bicycle manufacturer) - they were not looking for a way to replace their car with a bike.

Even 10 years later, in 1996, a person could walk into most US bike stores, ask about buying an Xtracycle, and be looked at quizzically, then get asked, “What is an Xtracycle?” by the sales clerk. And after taking the time to patiently explain to the clerk that the Xtracycle was not yet another 15-pound, $10,000 carbon-fiber road bike, but rather a way to make a bike into something that actually has practical every day function, one would often be placed into the category of “cranks and lunatics” and then ignored. Who would want to add pounds and cargo and passengers to a bike? Who would want to do anything other than load up the bike on the roof of the car, drive to one’s favorite biking spot, spin around for an hour or two garbed in Lycra, and drive back home? Kidding aside, your humble author did get responses of that sort when inquiring about products like the Xtracycle at local bike stores. Concepts like Peak Oil had not yet penetrated the mainstream, and gas prices were still quite low, so why worry about using bikes for transportation? But all of that soon changed with the advent of rising gas prices and the economic storm that followed.

When the right idea arrives before its time, it gives people ideas. The ideas ferment, slowly but surely, until the time is right for them to explode back with renewed vigor. As gas prices climbed in 2007 and 2008, and people started looking around for relief, the Xtracycle was there. It was still being produced by the same company that Evans had started, out of its small headquarters in the Bay Area of California, a fitting location for the start of such a revolution. The tripartite of high oil prices, concerns about Peak Oil, and concerns about climate change came together to make at least some people start thinking about alternatives to automobile-centric business-as-usual. The possibilities engendered by a bicycle that could easily carry people and gear (lots of it) became much more apparent. This culminated with an article in Salon magazine about the Xtracyle, along with significant shortages of the product due to unanticipated demand, in the summer of 2008.

Things have calmed down since then, but the idea that we need to move towards a future of less reliance on fossil fuels stuck in many people’s minds. The Xtracycle continues to help a steadily increasing number of people gain automobile independence for their daily errands. And with the likelihood of future oil price and supply shocks, the people who are getting set up with an alternative like this now are ahead of the curve.

Nothing new under the sun

The idea of carrying people and stuff on bikes is not so new. In places like China and the Netherlands, bikes-cum-pickup trucks are commonplace and have been for years. Most of the Chinese "cargo bikes" are rickety affairs that look like they are held together by bailing wire and duct tape. Most are wide-bodied, 3-wheel trikes with a single-speed gearing system. That works fine for China’s flat cities, but these “cargo bikes” would not likely catch on in places like the US. They are big, slow, cumbersome, and not particularly elegant. They are designed for a country that sets aside a portion of most major roads for exclusive bike use (like China) - not for a country that makes it a goal to explicitly ignore everyone but car drivers in its planning efforts (like the USA). Even the more elegant Dutch solutions, such as the Bakfietsen, only really work in places that have ample road space for bikes and minimal hills.

And that’s where the Xtracycle fits in. It takes an old concept and makes it work for places where there is less available space on the road, where people want gears, and where people generally demand a more aesthetic solution than duct tape and bailing wire. It may have been a fortunate accident that the Xtracycle has a narrow profile and is thus amenable to on-road use in places like the US. It was designed for use on narrow, winding foot paths; some people even use it for mountain-bike camping.

Most importantly, the Xtracycle has given people a very important idea: It is possible to build a bike for on-road use in North America that is practical for carrying cargo and passengers. In some areas of the US, such as Portland, Oregon,

cargo bikes like the Xtracycle are the trendy new family transportation alternative to the Sports Utility Vehicle - the Sports Utility Bicycle (SUB). This new revolution is slowly, but surely, making its way to other areas of the US, as well.

Electrifying bikes

It turns out that more than one revolution has been brewing in the bicycling world. Patents were filed as early as the 1890’s to document the idea of putting an electric motor on a bicycle to assist the human rider in going farther and faster. But the idea never gained traction, with good reason. From the 1890’s until more than a hundred years later, the necessary batteries were heavy and bulky and mostly of the lead acid variety (think of a car battery). If you add 100 lbs. of batteries to a bicycle, it is not really a bicycle anymore, because the weight would make it impossible to balance or pedal around if the batteries run out.

So the market shifted its focus to the automobile, since carrying a big bulky set of batteries - and later, a big bulky internal combustion engine - was not a problem on a large four wheeled vehicle. If we could go back in time and give those early electric-bike inventors modern battery technology, our car-centric culture might never have really gotten anywhere.

But by the time the Xtracycle was invented 100 years later, support for the electric bike idea was growing. Inventors around the world were revisiting the idea of adding electric power to the bicycle as a way to increase its comfort, speed, and range. In places like China, and more recently Europe, electric bikes quickly became popular. As many as 16 million electric bikes were put into use in 2006 in China, comprising as much as 20 percent of the total two-wheeled vehicles on the road. When I visited China in 2008, it seemed that the electric bikes made up as much as 1/3 of all two-wheelers in places like Shanghai.

Improvement in motor and battery technology contributed to this development. New batteries using nickel and lithium were much lighter and more compact than previous designs. Motors were integrated directly into the bicycle wheel hub, making them compact, light, and unobtrusive. And new controllers - the “brains” of an electric bike - were developed, resulting in low-maintenance, high-efficiency motors and giving bikes more range and reliability.

Despite these advances, electric bikes were much slower to catch on in the US. Accustomed to cheap oil and big SUV’s, people gravitated toward living arrangements that typically required fast-paced, long-distance movement in cars. While an electric bike can help cover a 10-25 mile stretch faster and more pleasantly than a regular bike, electrification doesn't suddenly make it practical to bike to one side of town for work, the other side of town for a business lunch, then out to the suburbs to go home at night. If it was not for the temporary phenomenon of cheap oil, this would never be considered a practical set of living and working arrangements.

It is cheating, right?

Another reason for slow electric bike adoption here is that many in the US have come to view bikes as purely recreational. And from the perspective of most recreational cyclists, using an electric bike would be considered “cheating.” This viewpoint has led most bike shops in the US to shun the electric bike. I never really understood that line of thinking, but it seems to go something like this: “If you don’t go out and sweat really hard, and you need help from an electric motor to get you around, you must be a bit of a wimp. And we aren’t catering to wimps.” (Or something like that.) If I used my electric bike in a bicycle race, of course it would be considered cheating. But I don’t use it for racing; I use it for everyday transportation.

“Electric bikes = cheating” is kind of a funny viewpoint. I’ll inject a short personal story here: I ride an electric cargo bike nearly every day to get myself, my kids, and my stuff around town. I pedal it all the time and get plenty of exercise while I am “cheating.” In the summer of 2008, I got talked into participating in a 200-mile, team-oriented bicycle relay race across the mountains of North Carolina, with each of four team mates to ride a 50 mile stretch with significant ups and downs. The race date came upon me quickly, and, being a busy parent with a full-time job and a fledgling business, I had little time to train. I went out for only two short training rides on my (non-electric) road bike before the race. I was the only female on my team (and one in her mid-40’s, at that). I thought I was going to completely bomb the race for my team.

We got to the race, and I was assigned the second and sixth of eight 25-mile legs for my team, using my regular, non-

electric road bike. For the first leg of the race, my teammate Jason maintained our position about 1/3 of the way back in the pack. As he came in, I hopped on my bike, and headed out, thinking, “If I’m lucky, I can keep us from falling to last place.” This leg consisted of a long, slow, grinding uphill for almost 20 miles before a final, short descent. Worrying about that climb, I managed to quickly pass two guys in front of me. One tried to stay on my tail, so I pedaled a bit harder, thinking he was back there, waiting to pounce the whole time. After 20 minutes or so, I looked back - and there was nobody to be seen. I was surprised, but also determined to maintain the lead I had managed. I stayed out in front and didn’t see another cyclist for the whole leg. My second 25-mile leg was a similar experience, where I passed a few more cyclists on a long, steep uphill climb - but I was not passed once. My team came in fourth place (and would have been in third place if we had been only a few minutes faster). I was honestly quite surprised at my own performance in the race, since I had gone in thinking I would be the one dragging us down, due to lack of training on my fancy little (non-electric) road bike.

I had always thought the “electric bikes are cheating” notion was silly, and this event provided strong confirmation. It suddenly became clear to me that biking often was the most important thing to maintaining my overall fitness. Some days I don’t pedal very hard if I’m not feeling up to it, and other days I pedal hard because I want to blow off steam. But either way, I pedal almost an hour a day. Most of the other people in that race-ride once or twice a week, in summer months, and that’s it (while using their cars to get to and from work and shopping). By inspiring me to ride my bike more often, the electric bike helps with my fitness and saves lots of oil in the process. Cars are energy hogs. Bikes, not so much.

When I see all the hoopla about electric cars, I cringe a bit. It’s not that I am anti-electric-car. In fact, I am currently helping someone do an electric car conversion, and I want to convert one of my own cars to electric, for those occasional times when I need to go longer distances. But the reason I cringe is that people are ignorant about to how much energy it takes to move around a large metal box in the first place - regardless of whether it is moved around using electricity or fossil fuels. Changing the source of energy from fossil fuels to electricity might be a small step in the right direction, but it is exactly that - a small step. With the world, and particularly the US, facing unprecedented issues related to our magnificent energy usage, thinking that electric cars will solve all our problems is a case of rearranging those famous deck chairs on that famous sinking ship. They won’t solve our problems, unless we all want nuclear power plants in our backyards.

Here’s why. (I have tried to keep it simple, but the next few paragraphs do contain a bit of technical detail). The plug-in hybrids may get as much as 100 miles per gallon - in an ideal world, based on a currently non-existent product. Let’s start with that optimistic estimate as our baseline. That sounds like great mileage, right? A gallon of gas contains about 37 kilowatt hours (kWh) of heat energy. In everyday terms, that is enough energy to run a 100 Watt light bulb for 15 days straight, or enough to run a typical chest freezer for about 35 days (based on my own real world usage). , In practice, only about 25% of the energy from a gallon of gas can be turned into electricity (8-9kWh). That makes it a bit difficult to equate MPG with electrical inputs, because the equation depends on whether you factor in the tremendous inefficiency of gas-to-electric conversion. So, an easier way to measure the efficiency of an electric vehicle is in watt hours per mile (Wh/Mi). Plug-in hybrids, when they arrive, might achieve an energy efficiency of 100 to 150 watt hours per mile, i.e. for the electricity used in one mile travelled, you could run a 100 watt lightbulb for an hour, or a chest freezer for 2-3 hours. What this means is that in driving about 8-12 miles with an über-efficient hybrid, you used up enough energy to run a chest freezer around the clock. Food, or car?

Now, let’s say that you want to convert your house to all-solar to support the driving of your electric car, rather than relying on fossil fuels or new nuclear plants. How much energy does that take? If you drive an average of 30 miles per day, and account for charger inefficiencies (20% loss or so), you’d need about 3.6 kWh of energy per day. That means at least a 1-2 kW solar installation (depending on the latitude) just to support the usage of a single car for short trips (based on 5kWh/day average from a 1 kW system). One recent estimate is that it costs from $8,000 - $12,000 per installed kilowatt for residential systems. And that’s before you think about solar for the lights, computer, refrigerator, and so on. It isn’t pocket change. Plus, that estimate does not factor in all the energy consumed on your behalf to deliver your groceries to and from the store, your mail to your mailbox, and so on. If we count all these energy sinks vehicles in our calculation, your roof could be covered in solar panels only to support all the cars and trucks in your life (putting a big hole in your budget and not providing you with energy for other uses).

For comparison, real-world usage of my electric cargo bike averages 15-18 watt hours per mile when I am carrying my

daughter and my computer for work. (Remember, the best plug-in hybrids get 100 or so watt hours per mile). That ride involves just over 1,000 ft of hill climbing in an undulating geography. I typically travel 18 miles round trip, sometimes more if I have errands to do, but for a fair comparison to the car, let’s say I travel 30 miles per day. At 16 Wh/mile, that would be 480 watt hours expended, or 576 Wh with charger inefficiencies. Providing 576 Watt hours from solar isn’t nearly so hard. If I invest in a 1 kW solar system that generates, on average, 5 kWh per day, I can fully power my electric bike, and my freezer, and my refrigerator, and my laptop computer, and my stereo, plus a few energy-efficient lights. That’s a big difference from the car, which would only leave enough energy to spare for the freezer, and that’s it. And this actually works, because I’ve tried it.

So here we’ve compared an idealistic estimate of a very efficient, not-yet-available-for-sale, plug-in hybrid, versus the real-world energy usage of my loaded electric bike in a hilly area. The bike is almost six times more energy efficient, because I am not moving a big metal box around at high speeds. In fact, I have not yet encountered any form of transportation that rivals the electric bike for energy efficiency. Even human-powered bikes are not as efficient, because our bodies are not particularly optimal at converting food into work energy. One estimate puts humans eating the typical American diet at about 100 miles per gallon (MPG) and vegetarians at a few hundred MPG - better than the electric car, but a lot worse than the electric bike.

Energy is important, but living life fully is even more important

There is something more subtle in favor of bicycling than just the energy equation. While riding the bike, I slow down, get to know my surroundings, and feel like I’m part of the community, rather than feeling isolated from it. Many of us have been discovering the value of “relocalizing” - getting in touch with our neighborhoods and communities to support one another during these crazy times. But that’s hard to do when zipping around in a big metal box. If I see a friend while biking, it is easy to stop and have a chat. I can smell the unique smells (it is springtime here in North Carolina) and hear the unique sounds of each part of my community. When there’s an event going on at one of the local gathering spots, I can hear the music and feel the energy of the crowd. I often stop and help box turtles across the road (not so easy to do in a car) and watch them as they wander off into the bushes. And all the while, I am getting consistent, moderate exercise.

When it rains, I get to feel that too. I used to mind that part, but one day after watching my young daughters run outside to play in a rainstorm - totally unfazed - I realized that my distaste for the rain was a learned thing, something I could unlearn. So I did. But more importantly, biking daily has taught me to pay attention to my surroundings. (Although I still don’t ride in thunderstorms, as I have an aversion to anything over about 100 volts or so.) Cars have taught us to ignore our surroundings and just go on our way, unaware of whatever conditions may exist in the world around us. It’s like the time when I was much younger, when I tried to drive a car across Nebraska in a historic snowstorm and ended up stuck in a 3-foot snow drift in the middle of I-80 (which was closed for 2 days). I would never have attempted that on a bike. I would have stopped and waited until the weather was better. The "old me" was impatient to get where I was going fast, and, as a result, I missed the joy that could be had along the way. The "new me" has rediscovered the simple joy of getting there, with all its twists and turns.

I believe this is a parable for all of modern society. We have become so accustomed to our modern conveniences that we are led to a depressive sort of "doomer" mentality, thinking that some of them might be taken away by the likes of Peak Oil and Peak Money. Many people seem to lack imagination regarding how they would get by without their metal boxes to zip around in, their air conditioned houses to live in, and their always-on Internet connection. If my experience with bike riding is any hint, we’ll get by just fine.

Bikes are unsafe? Sitting on your rear end is less safe.

One of the byproducts of oil abundance and our resulting modern system of agriculture is that many people in the modern world, particularly the USA, are overfed. While people get scared about things like the latest flu epidemic, or getting hit by a car on their bike, the number one killers for many years running have been heart disease and cancer. And the number one way of reducing those deaths is exercise.

A lot of people have been trained to think that bicycling is dangerous. A big part of that perception has come from well-meaning but misguided individuals who promote helmets as the main form of bike safety. But statistics indicate that when helmets are mandated, bicycle usage drops and fatality rates per cyclist increase. I’m not trying to restart the great helmet debate here, as there are merits to both sides of the argument (and I wear a helmet myself). What I am trying to point out that focusing on head protection as the means to be “safe” while cycling makes cycling

seem more dangerous, regardless of actual facts. If we suddenly started telling every pedestrian to wear a helmet, would it save lives? Some people who get hit by a wayward car or accidentally fall and hit their head might be saved. But it is likely that significantly fewer people would want to go out for a walk if helmets were mandated. And if most people stayed home (or in their cars) rather than walking, we’d have even more overweight people at high risk of dying from a heart attack. That would be unlikely to save lives in the long run.

After hearing about a recent cyclist fatality in my area, I again started wondering, am I crazy for riding every day while carrying my daughter? But I quickly reminded myself of a few facts. The first is that, where my daughter is concerned, the problems with childhood obesity (and the resulting problems with cholesterol) are so bad, the American Association of Pediatrics recently started recommending use of Lipotor in kids. Even though my daughter doesn’t get a lot of exercise riding on the back of my bike, the number one predictor of how kids will turn out is the example their parents set. It is not so surprising that my daughter is active and rail-thin, not at risk for childhood obesity. She loves riding her bike, she loves the outdoors, and she loves being active.

And it’s not like cars have a perfect safety record; in people under the age of 29, cars are the leading cause of fatality. While the car provides a nice metal box to shield from a slow speed accident, what people don’t often realize is that the high speeds involved in car use are often what kills. Though bicycles don’t have the protective box, the speeds are much slower, and a significant fraction of accidents don’t involve a car. That is why bicycles are vastly safer than motorcycles (which are both high speed and have no metal cage). I suppose any time one ventures outside the home to travel around, dangers lurk. Just in the past year, two pedestrians have been killed by autos within blocks of my workplace. Given that the world is dangerous no matter how one gets around, is fear the right response?

When I think about that, I only have to remind myself of a recent time when I was forced to stay off my bike for 6 weeks due to medical reasons. I gained weight, my triglycerides shot up, and I had very low energy. This leads to the bigger picture. In a study called Pedalling Health, the authors quantified the tradeoffs between the chance of getting hit while riding a bike, versus the reduction in chances of death due to heart disease, cancer, diabetes, and the like. Their conclusion is that regular cycling would save 66 lives per 100,000 person-years lived by the general populace. This is echoed by many other such studies, showing that the health benefits generally far outweigh the chances of serious accident. So it is not bicycles that are dangerous, it is sitting on your rear end that is dangerous.
Putting it all together: The electric cargo bicycle

The longtail cargo bicycle and the electric assist are both pieces of a puzzle. That puzzle is how to make a bicycle into a practical people-and-stuff mover for everyday use for short trips, in place of a car. The cargo bicycle on its own is a great concept, but if you live in a hilly place (like I do), it can be a bit difficult to haul a hundred pounds of kids or dog food up and down those hills on a regular occasion. After we got our new Madsen cargo bike, which can haul up to four kids at once (covered in more detail in Part II), I was excited to own a whole-family transportation bike. But the ride from my home starts with a big hill. And if I was feeling less than 100%, I was just not motivated to pedal that bike full of kids up that hill. The end result was that, in the first 2 months that we had the bike, I used it about once every week or two for a weekend outing to the park or farmer’s market, and that was all I could handle. The point was really driven home to me on Easter weekend when I wanted to bike the family over to an Easter egg hunt, which was in a hilly part of town about 8-9 miles away. After getting everyone together, I realized that I didn’t even know exactly where the hunt was located, and since it was in the hilly part of town, I might get lost and wander around for a while looking for the place. The thought of hauling a bike full of kids over steep hills when lost was too much for me, so we took the car. It turns out we did have troubles finding the place, so my concerns were founded.

Then we installed an electric assist kit by eZee. What a difference! Suddenly it became fun to load up the bike with kids and go out for a ride. I wouldn’t have worried about getting lost, because hauling the kids up the hills became easy to do. This particular electric motor kit is activated by a throttle control that is on the handlebar, similar to a motorcycle throttle. I can pedal the bike, I can use electric power, or I can do both together. So I have complete control over when and how much power I want the electric motor to add (and even though I’m in pretty good shape, the motor can do more than I can!) We now use the bike all the time for running kids around the place. And it works great for doing errands like picking up dog food, garden mulch, and other big bulky stuff.

Some practical examples

I like to tell stories about the ways in which I use my electric cargo bikes in place of a car. Even a few years after I got my

first e-cargo-bike, the fun and excitement of loading up the bike with a load that normally would require a car gives me a thrill. I’m easily entertained.

I live out of town, on a country highway that has a few big hills and some fast traffic. I would love it if our state would provide larger shoulders on the roads, but they do not. One thing that the electric assist does in this situation is significantly increase my speed up the hills. If there is traffic, I don’t feel like I’m holding everyone up, like I would if I was on my own power alone. Instead, I zip up the hill quickly and can get out of the way. In general, the electric assist helps me maintain a high average speed (usually 16-20 mph even with a fully loaded bike), so that I can get past the busy road sections quickly. In town, I often keep up with traffic, and I just ride with traffic rather than on the side (and I definitely avoid the sidewalk, which is more dangerous than the road, in most instances).

About a year ago, I was picking up my daughter at daycare, and ran into a friend who was sadly moving out of town the next day. She offered that I could take some spare food that she didn’t want to move, so I went over to her house to pick it up. It wasn’t just a little; it was about 100 lbs. of various foodstuffs from both her refrigerator and cupboards. Fortunately, I was able to easily load this up on my bike, since I always carry a spare strap or two with me. Previously, errands like this were reserved for the car only. Some folks use bike trailers, but the problem is the trailer is not often on your bike when you need it, and this was a perfect example. I wouldn’t have had the trailer with me when she just happened to mention the food she had to give away, and since my home is out of town, it would have taken too much time to ride home, get a trailer, then ride back.

Those kinds of experiences are regularities for me. I’ll often need to stop and pick up a few groceries or a bag of dog food on the way home. Sometimes everyone is too tired to make dinner, so I’ll stop for takeout food. It would be difficult to load up enough takeout for a family of five on a regular bike (or in a backpack), but loading it up on the cargo bike is no problem.

Being that I take on too much in my life and I don’t get enough sleep, sometimes I catch a cold. The electric bike is great - it allows me to still get outside in the sunshine and fresh air, without over exerting myself. And if I am late for a meeting or appointment, I can use full throttle on the assist to get where I’m going faster. With my regular battery, made of newfangled Lithium Iron Phosphate (LiFePO4), I get about 20 miles of range per charge if I am going full-tilt. If I am conservative with the throttle, only using it to help on hills, I can easily extend the range to 30 miles. I charge it by plugging its automatic charger into an inverter connected to my solar system. For people without solar, you’d just plug it into a regular wall outlet. Charging takes only 4-6 hours, and typically takes less than 0.5 kWh (about 0.05 cents in most areas at current rates). That’s the equivalent of 1,000-1,500 miles per gallon, cost-wise. That’s hard to beat.
Electric bikes and the law

The US law covers electric bikes as products under the Consumer Safety Product Commission. To be considered a bicycle and not a motor-scooter, an electric bike shouldn’t exceed 20 miles per hour (or 700 watts) for the electric part, though it is fine if your pedaling or coasting (e.g., downhill) makes the bike go faster. This law addresses the sale and import of complete electric bikes. However, it doesn’t directly cover an electric motor that you add to your own bike after the fact, so that remains a gray area (and there are electric motors that can make the bike go much faster than 20mph, though the safety of doing so becomes a bit questionable). For electric add-ons to your own bike, when it is used on public roadways, it will generally be covered by individual state laws. Some of those say nothing about electrified bikes, and others specify that one must register any motorized bike with the Department of Motor Vehicles (DMV).

I have lived in states where the law says nothing about this (like NC), and others that specify that I should have registered my electric bike with the DMV (like UT at that time), though in the latter case I didn’t know that I should have registered. In all my experience, I have never been stopped or questioned. The electric motor is small and quiet, so it does not bring attention to its presence. When I am on a bike path, I pay attention to slowing down whenever there are pedestrians or other cyclists. By riding unobtrusively and not drawing attention, I have not had issues. I look like I am riding a normal bike, I am always pedaling, and my bike is traveling at speeds which a bike is expected to travel (though at the high end of that range). Nonetheless, for those living in states with such requirements, my first suggestion is to contact your favorite legislator to see if you can get the law changed. If one is concerned about oil scarcity, then it is important to be encouraging alternatives like this, and having to register a bike as a motor vehicle is a turn off to some people (though in reality, our customers who have done that don’t think it is was very difficult).

Wrap-up: Why new types of bikes make it easier to ride rather than drive

The developments introduced here solve some of the main impediments to people biking more and driving less. The electric bike makes biking easier and more fun, so it encourages more frequent riding. And the cargo bike allows you to carry kids, groceries, or stuff on your bike. (To get ideas, go to flickr.com and type in a search for “Xtracycle” to see all the crazy things people have carried, from dogs to ladders to furniture to beer kegs).

For people who are Peak-Oil-aware and/or concerned, a bike is an ideal solution: It is low energy, gets you in touch with your community, and doesn’t rely on the availability of gasoline supplies. In Part II of this article, I will cover the various types of cargo bikes and electric bikes that are presently available, where to get them, and how much they cost.

About the Author

Dr. Morgan Giddings is a former recreational cyclist who turned into a utilitarian cyclist after learning about Peak Oil. After unsuccessfully attempting to work with local bike shops to obtain an electric cargo bicycle, she became frustrated at the difficulty involved in ordering all the bits and pieces needed and making sure that they would work together. So in the midst of a busy career as a professor and parent, she co-founded Cycle 9, a bike shop focused on putting together practical solutions, including cargo bikes and electric bikes, that help people ride their bike more and use cars less.

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