

## Techstars company retrofitting fleet vehicles into plug-in hybrids



[fluxhybrids.com](https://fluxhybrids.com) Charlotte, NC

B2B Hardware Energy Science & R&D

### Highlights

- 1 Techstars Alabama Energytech portfolio company
- 2 Massive market ~200 million fleet vehicles, with 1% of commercial van and truck sales electrified.
- 3 Contribute to the immediate reduction of transportation-related carbon emissions
- 4 Our technology pays for itself in savings in 3.5 years for the average fleet in the US.
- 5 Fleet vehicles are projected to be some of the slowest to electrify due to their rigorous use case.
- 6 A patent-pending system that allows for integration across gas, diesel, or other combustion engines
- 7 Beginning a paid pilot with Alabama Power Company, one of 13 fleets operated by The Southern Company

### Our Team



**Micah Ulrich** CEO

BS & MS Mechanical Engineer from NC State Micah is an automotive professional, with a broad set of experiences ranging from working as an ASE-certified technician to electronics design and controls with BMW and other auto manufacturers

I grew up where almost everyone has a truck whether they need it or not. I realized early on that although the world would be better if everyone drove a Prius unless they absolutely needed a truck, that wouldn't happen. So the solution was to make trucks as efficient and clean as possible at a price that paid for itself so it would be a no brainer



**Cody Biedermann** CTO

BS Mechanical Engineering from NC State An automotive professional skilled in all facets of design and experience in leadership from creating a solar car to energy analysis for NC state government.



**Clay Dowdey** COO

BS Chemical Engineering from NC State Clay is a process engineer with experience working with multiple Fortune 500 chemical companies. His knowledge of manufacturing and operations supports product flow, supply chain, and fleet pilot programs



**Bryon Spells** Systems Engineer

BS & MS in mechanical engineering. Focused on widely adoptable, efficient automotive technologies. Founded SolarPack at NC State and researched AI-enabled powertrains at Stanford before Flux Hybrids.

## Pitch

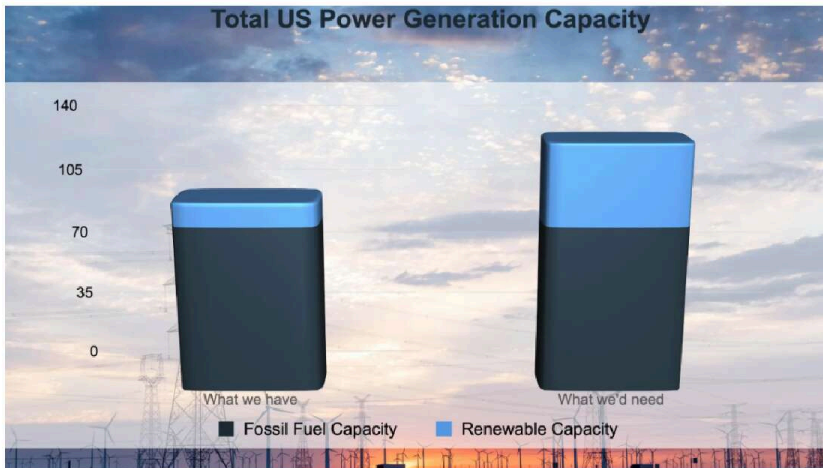


We've seen historic increases in the price of transportation in the last few months. Whether it's semiconductor shortages making used cars worth more than new cars, or conflict putting a strain on gas prices yet again, it has never been more expensive to just get from point A to point B for the average person. Now just imagine how much harder these changes have impacted commercial fleets. But what if there was a way to cut these rising fuel costs in half?





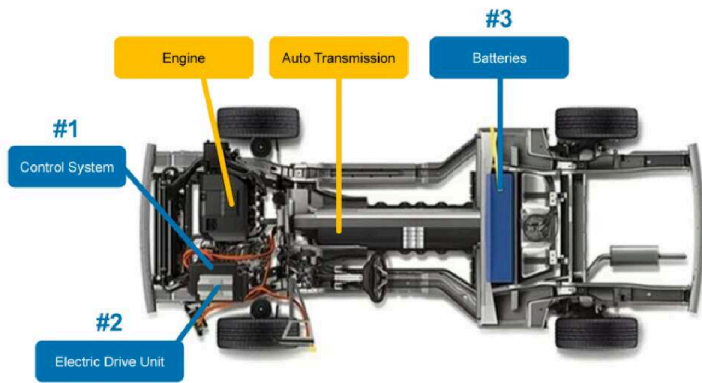
You probably immediately pictured something like this. Electrification is front of mind, and by replacing just half of their hundreds or even thousands of vehicles with some brand new all-electric trucks they could put a huge dent in their fuel costs. Except for the fact that it would cost a fortune, these vehicles aren't even available in mass quantities due to supply chain issues, and on top of all that how would you charge all of them?



And in 2018 researchers at UT Austin asked themselves that same question, and they came to the conclusion that we would have to increase nationwide peak power generation capacity by 30% to support an all-electric automotive fleet. That is an increase of terawatts of power which will take billions of dollars of investment and decades to bring online through renewables. And that's just generation capacity, the bill quickly climbs into the trillions when you account for the infrastructure needed to transmit that power to EV chargers, and then the cost of the chargers themselves. On top of that, all of these dollars would be spent on infrastructure projects that take years to get off the ground and decades to complete.



But with our technology shown here on this 2008 Ford Ranger, you can get all the benefits of electrification, with the flexibility of gas on your existing fleet vehicles today, without being slowed down by any infrastructure. We offer an aftermarket plug-in hybrid conversion. This allows fleets to drive their short everyday drives on electric power, while still offering them the flexibility of gas to ensure they don't have downtime due to lack of charging infrastructure. On top of that, it makes their gas driving even more efficient than it was before.



We splice our 3 component electric powertrain in parallel with your vehicle's existing gas powertrain. It consists of an off-the-shelf automotive-grade battery pack which we put in place of the spare tire (don't worry we add a can of Fix-a-Flat). This battery then powers an electric drive unit feeding into our patent-pending mechanical integration system which allows the system to run on electric-only, gas-only, or some combination of the two. And all of this is managed through our proprietary control algorithm which is constantly optimizing the system for maximum fuel efficiency. In our first prototype, we were able to achieve the following reductions in costs and emissions...

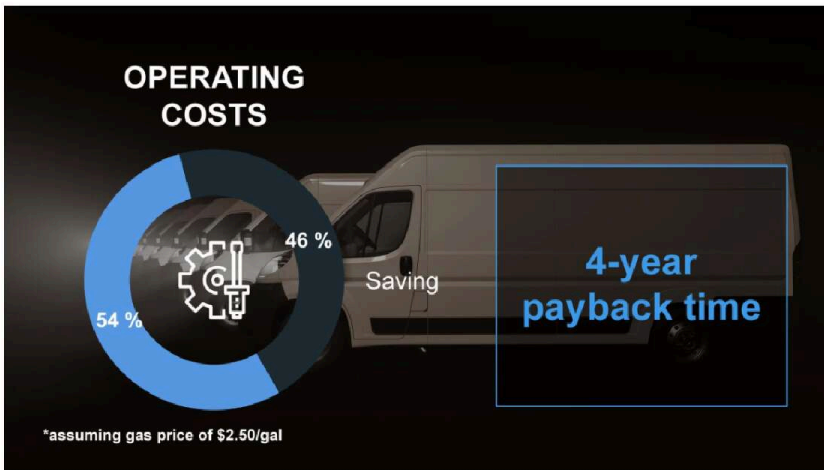


(due to reduced engine use and increased brake life from regenerative braking)





(We took our 2008 Ford Ranger prototype from 17 MPG to 34 MPG on the EPA rated combined drive cycle tested in collaboration with researchers at NC State University, further information can be found in the attached Data Report)



These results were so good, that when we evaluated the cost savings for an average fleet in the US, our system paid for itself in savings in about 4 years for the average fleet. However, in some states, it pays off almost twice as fast due to higher gas prices as well as several government incentives. (More information can be found in the attached ROI Calculator)

	<b>FLUX</b> HYBRIDS	<b>XL</b> Fleet Electrification
<b>Price</b>	<b>\$10,000</b>	<b>\$26,000</b>
<b>Efficiency increase</b>	<b>100%</b>	<b>50%</b>
<b>Emissions reduction</b>	<b>40%</b>	<b>25%</b>

We do have some competition in the hybrid conversion space. Specifically XL Fleet also converts hybrid light-duty fleet vehicles such as pickup trucks and vans. However, their best commercially available system compared to our prototype is more expensive and less efficient. The key differentiator between us is the proprietary methods we use to convert, they remove the OEM driveshaft and replace it with an electric motor and a shorter driveshaft, we integrate our system upstream of the transmission between the engine and transmission.

Their method has a custom electric motor that has extreme operating characteristics since it must apply high torque at a high RPM since it doesn't

benefit from the gear ratios of the transmission. This means that their system adds significant weight to the vehicle, approximately 400-700 lbs depending on the model.

Meanwhile, our first prototype system is a much lower cost and lighter technology since we can use smaller, cheaper, off-the-shelf motors in tandem with the existing transmission to propel the vehicle. Our system only added a net weight gain of 60 lbs to the Ford Ranger prototype shown above.

The simplest comparison however is in return on investment. Our technology can pay for itself in 4 years, XL's would take almost 10 years to pay off under the same conditions.



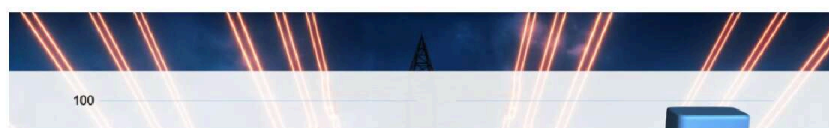
The market for technologies like these is huge, BloombergNEF estimated that there are a total of 200 million light commercial fleet vehicles globally in 2021 and in 2019 there were over 8 million new ones sold with the majority of those being trucks and vans. All of these fleets are looking to electrify and begin transitioning to lower-carbon options, just not at the price of sacrificing reliability or operational readiness. This has led to a huge bottleneck and several missed goals set forth by some of our nation's largest fleets. In short, this market is starving for a solution that will allow them to transition away from the volatility of gas without sacrificing reliability, operational readiness, or profits.

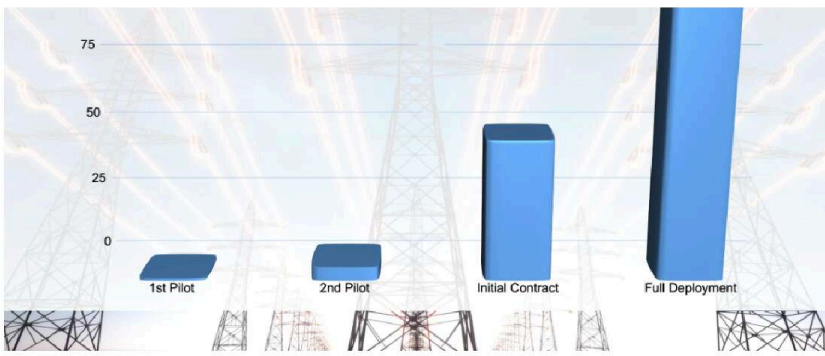


 **Alabama Power**



That's how we've gotten our foothold in the market with early traction and interest from several fleets. Specifically, we have a paid pilot with Alabama Power Company's maintenance fleet of 7500 vehicles, which is scheduled to start in April of 2022 on this 2016 F-150.





This first vehicle pilot is key because if we hit our milestones on reliability and fuel efficiency, we would then move to a stage 2 pilot with Alabama Power Company of 10-25 F-150s. Additionally, a successful first vehicle pilot would open the door for the fleets of the other 12 subsidiaries of The Southern Company to begin at stage 2 pilots of 2-5% of their F-150s.

Additionally, we've received significant interest in pilots after our APC pilot is completed from 5 other fleets, ranging from as small as 20 vehicles in a landscaping fleet, all the way up to 13,000 vehicles in pest control.

Finally, we are constantly receiving calls and emails from private customers nationwide interested in a consumer version of this conversion. We have received approximately 400 total with more coming in every day. But the key to our growth is completing this first stage 1 pilot with Alabama Power Company.



And we have the perfect team to execute on that, we are a team of NC State and Stanford-trained automotive engineers with extensive hands-on experience through undergraduate and graduate education. On top of that, when COVID hit one month after we founded this company, we lost access to all our shop space and tools. But we didn't let that stop us, we kept working.



In this parking lot, for a year and a half. We worked through freezing rain in the winter, and the scorching North Carolina summer, all while scraping by off student loans. We did this because we know the transportation industry needs to be transitioned to a cleaner future and the current plans won't get it there fast enough.



Thanks from the Flux Team and we hope you'll join us on our mission to convert our trucks into the fleet of the future.

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## Downloads

[Flux Hybrids ROI calculator 2021-11-2.xlsx](#)



[Data Report.pdf](#)