



A Cleaner, Greener Harvest Thanks to Electric Tractors

By Alf Poor, CEO of Ideanomics with contributions from Christiane Heckerroth, Chief Communications Officer of Solectrac

The increasing demand for organic foods gets a lot of headlines. Consumers have shown they are prepared to pay a premium for foods with an untouched pedigree, which has helped bolster the thin margins in both farming and at the point of sale. Returning our food to a closer version of its natural self is a good thing for all, but so far there has been a lack of attention surrounding the heavy machinery required to produce food at scale, namely the tractors, harvesters, and other diesel-powered vehicles that farmers use to help toil the land to feed the world's increasing human population.



It's a similar tale in the automotive sector, where all eyes are focused on passenger electric vehicles, with some recent appetite being shown for pickups and trucks. With such heavy focus on the consumer, and

a growing focus on trucks, a vital industry has been largely overlooked – the agricultural sector. There are more than 570 million farms worldwide, and 90% of them are run by individuals or a family and rely primarily on family labor.⁽¹⁾ Subtract those family farms in developing countries and the number of farms globally is still in the region of 50 million.

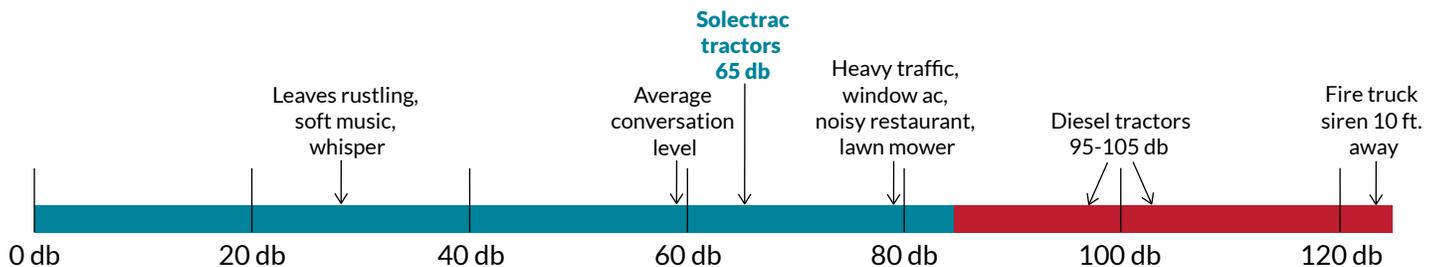
Large scale food production means farms, by their very nature, are in rural areas. Factors such as easy access to fuels like gasoline or diesel, vehicle maintenance, and cost may be impediments to the broader use of tractors. Solectrac, a California-based electric tractor company, has a solution. It has developed 100% battery-powered, all-electric tractors for agriculture and other types of utility operations. In addition to charging from the electrical grid, electric tractors can be powered by clean renewable energy such as wind and solar, providing farmers and their farms with the option of independence from infrastructure constraints and the price volatility associated with diesel and gasoline. Additionally, electric vehicles have significantly fewer parts, reducing the time and cost of the complex maintenance needed to keep diesel- or gasoline-fueled engines available as required. For farmers using tractors powered by internal combustion engines, the value proposition to convert to electric is compelling. And the benefits do not end here.

Most of us live in an urban or suburban environment, and our idea of a farm conjures up images of neatly

lined crops on rolling hills with blue skies. While we would like to believe that rural areas mean clean, fresh air, the reality is that gasoline and diesel-fueled tractors and farm machinery are extremely noisy and spew particulate matter with a host of harmful micropollutants, including hydrocarbons, nitrogen oxides, and carbon monoxide. These micropollutants spew out into the air and fall back to earth, infiltrating everything from crops to our rivers, lakes, and reservoirs. The consequence is that our crops are impacted twice by these pollutants; once directly through the air and a second time via the irrigation system resulting in reduced yields and nutritional quality and overall safety concerns for consumption.⁽²⁾ In the same manner that we eschew the use of harmful pesticides on our produce, shouldn't we also ensure that our crops are grown in environments with clean soil and air? The shift to electric tractors will contribute significantly to solving some of these issues. Like other electric vehicles, electric tractors are quiet and produce zero emissions. Using cleaner farming tools yields cleaner crops. As Solectrac expands the global sales of its electric tractors, farmers will reap the economic benefits in addition to helping protect our precious farming environments and provide us with cleaner, healthier food.

Founded in 2012, Solectrac and its founder and CEO, Steve Heckeroth, have racked up some impressive credentials. It has received grants from the U.S.-India Science and Technology Fund (IUSSTF) and the National Science Foundation (NSF). This year, Solectrac received

Decibel Level Chart



Sound levels under 85 dBA are generally thought of as “safe,” although there is some risk of hearing loss for prolonged exposures to 80 dBA. - National Ag safety database

Safe exposure to 105 dB is 4 minutes. - National Ag safety database

the World Alliance Solar Impulse Efficient Solutions label from the Solar Impulse Foundation. The label was awarded for being one of the one thousand most efficient and profitable solutions that can transition society to being economically viable while being environmentally sustainable. Solectrac was also incorporated as a California Benefit Corp in 2019.

The global agricultural tractor market is currently valued at \$75 billion, with the North American agricultural tractor market expected to reach \$20 billion by 2023.⁽³⁾ The largest segment for agricultural tractors is the below-40HP segment, where Solectrac's initial three models address the market's broad needs. Its tractors are specifically designed to serve the needs of community-based farms, vineyards, orchards, equestrian centers, greenhouses, and hobby farms. Also, keep in mind that this figure is conservative since it is only for the current agricultural industry and does not account for farms where diesel- or gasoline-fueled tractors are not feasible or economically viable.

Ideanomics' made a strategic investment in Solectrac at an opportune time. In September, California announced an unprecedented mandate to sell only zero-emissions vehicles by 2035. While this applies to passenger cars and trucks, it indicates a global movement that favors and supports clean energy vehicles. Solectrac's home state of California, which is the sixth-largest economy in the world, makes up 12.5% of the total U.S. agricultural production.⁽⁴⁾

As yet another indicator of California's dedication to addressing Climate Change, Solectrac was awarded



a \$500,000 grant in June 2020 from the Bay Area Air Quality Management District as part of its Funding Agriculture Replacement Measures for Emission Reductions Demonstration Program, or FARMER program, which provides incentives to reduce agriculture sector air pollutants and greenhouse gas emissions. Solectrac's tractors will be tested against their fossil fueled counterparts in vineyard and farming applications in a year-long demonstration project.

This project was supported by the California Climate Investments program. The FARMER program is part of California Climate Investments, a statewide program that puts billions of Cap-and-Trade dollars to work reducing GHG emissions, strengthening the economy, and improving public health and the environment—particularly in disadvantaged communities. The Cap-and-Trade program also creates a financial incentive for industries to invest in clean technologies and develop innovative ways to reduce pollution. California Climate Investments projects include affordable housing, renewable energy, public transportation, zero-emission vehicles, environmental restoration, more sustainable agriculture, recycling, and much more. At least 35 percent of these investments are located within and benefiting residents of disadvantaged communities, low-income communities, and low-income households across California. For more information, visit the California Climate Investments website at: www.caclimateinvestments.ca.gov.

The market opportunity for the state alone has tremendous revenue potential. As Solectrac expands its sales efforts and demand increases, Ideanomics will leverage its China operations to help Solectrac with cost and timing efficiencies in their electric motor and battery supply chains.

Our strategic investment in Solectrac is archetypal of our overall M&A strategy, which must fulfill the following criteria: it must be synergistic, possess something proprietary, have a proven viable product,

and have existing sales. Soletrac is naturally a great fit for our specialty vehicle and heavy truck division, Medici Motor Works. Since we entered the electric vehicle space in 2018, we've gained a lot of experience from OEMs, supply chain partners, and manufacturers – all of which will help Soletrac improve its manufacturing processes, lower production costs, and scale quickly to meet anticipated market demand. The company currently boasts both awarded and pending patents, three electric tractor models with another in design stage, and sales as well as an active order book.

The future of electric tractors has never looked brighter. Soletrac has built a business based on the real world needs of farmers and the agricultural industry, blending those with clean energy ideals and practical applications of modern technology, and we are very proud to be a

strategic investor. As well as the monetary investment to help fund expand their operations, we will be assisting them in scaling their business through helping with everything from global supply chain efficiencies to expanding their marketing and distribution, utilizing our MEG, Treeletrik, and Medici Motor Works divisions. The planet, and the food grown on it, has a chance to be healthier and more productive and companies like Soletrac are helping make that a reality.

(1) <http://www.fao.org/3/a-i4036e.pdf>

(2) <https://sustainablefoodtrust.org/articles/the-impact-of-air-pollution-on-crops/>

(3) <https://www.globenewswire.com/news-release/2020/01/21/1972765/0/en/Global-75B-Agriculture-Tractor-Market-Size-Trends-Competitive-Analysis-and-Forecasts-2019-2024.html>

(4) <https://norcalwater.org/2017/08/04/california-agriculture-a-state-of-abundance/#:~:text=To%20put%20this%20in%20perspective,production%20for%20all%2050%20states.>

