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How solar car parks are becoming hot property: Interview with 3ti

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Solar car parks are becoming popular in the UK. 3ti provides insights into this trend.

Solar car parks are gaining popularity as they provide power generation and protection for vehicles. Demand for these car parks, often located near hospitals, shopping centers and offices, has grown in the UK. Businesses are increasingly adopting on-site renewable energy solutions to reduce electricity costs, making solar car parks an attractive option. To gain more insights into this trend, we interviewed Mark Potter, chief technical officer of 3ti.

Key takeaways:

- 3ti's mini pop-up solar car park and electric-vehicle charging hub, Papilio3, is offered for rent with no upfront costs. The company claims the value of solar generation is typically £5,000-8,000 per year, depending on the customer's energy tariff. The revenue model for EV charging depends on the customer's energy tariff and the price they set for drivers. Its customers can choose from free charging, discounted rates and commercial rates. Typically, customers need to set an end-user tariff that is about 10 pence more than their electricity cost to break even.
- Papilio3 is an on-grid solution that requires access to a grid supply because solar generation alone is not sufficient for reliable charging throughout the year. Running cables can be expensive if the grid supply is far away, but most parking facilities are near the buildings they serve, allowing for the reuse of existing cable routes. 3ti's focus is currently on mainland UK locations, where installation is typically straightforward. For larger-scale solar car parks, having a local off-taker with high energy consumption, such as factories or data centers, is key to commercial success as behind-the-meter solar can significantly reduce their energy costs.
- The "unexplored middle ground" refers to the charging options available to EV owners at workplaces and other destinations. Many public charging installations offer low power levels, resulting in slow charging speeds and inconvenience for EV drivers. 3ti addresses this by offering charging points with power levels of up to 22 kW, providing faster and more reliable charging.

The following is an edited transcript of the conversation.

S&P Global Mobility: Can you tell us about 3ti and your pop-up solar car park and EV charging hub, Papilio3?

Mark Potter: 3ti specializes in solar car parks in the UK, offering integrated solutions that combine solar photovoltaic electricity generation, battery energy storage systems (BESS), and electric vehicle charging. Our solution aims to convert parking facilities into assets that generate revenue and contribute to the energy transition. This provides businesses and EV drivers with a cost-effective alternative to home charging.

Papilio3 focuses on the medium-dwell workplace and destination market segment, including offices, shopping centers, leisure facilities, hospitals and conference centers, where EVs are usually parked for three to six hours. The unit is installed "behind the meter," allowing customers to have control over EV charging tariffs and making use of Papilio3's approximately 18 MWh/year solar generation.

What sets Papilio3 apart from other EV charging solutions in the market?

Papilio3 is made from upcycled shipping containers, supporting a low-carbon circular economy and enabling easy scalability. It eliminates the need for expensive grid upgrades, providing fast access to EV infrastructure within weeks. The solution incorporates onsite solar generation and smart energy management to reduce carbon emissions and lower installation and energy costs for EVs. Papilio3 is an all-in-one solution that includes 24/7 driver support, contactless and roaming payments, smart lighting, CCTV, advertising displays and smart grid controls. These features are managed through the proprietary 3tiG software platform.

How many EV charge points can Papilio3 support, and how does solar and battery technology enhance charging in this context?

Papilio3 can charge up to 12 EVs at power levels of 3.6, 7, 11 or 22 kW, depending on the onboard charger of the vehicle. It is powered by a combination of 42 solar panels and local mains electricity. On average, installations generate 20-30% of the energy supplied to EVs from solar sources, with any surplus solar energy being exported to the host site or grid.

We have space for up to half-a-megawatt of storage, and a microgrid architecture to support it. For most installations up to 250 kWh is sufficient and can be retrofitted if, and when needed.

Can you elaborate on the ease of planning and grid connection approvals for Papilio3 installations?

Although recent changes to permitted development still require us to submit applications to the Local Authority on a site-by-site basis, we typically apply for planning even if it is not necessary.

For DNO (distribution network operator) grid approvals, Papilio3 is eligible for the 'green channel' faster approval process. Our smart microgrid control systems also eliminate the need for dedicated, reserved capacity. Similar to the planning process, we usually handle the DNO applications on behalf of our customers. DNOs are supportive of EV charging infrastructure that helps reduce peak power consumption and decarbonizes energy.

What is the pricing model for Papilio3, and how does it differ from traditional capital investment models?

We usually deploy Papilio3 on a rental model, where capital, installation, operation and maintenance costs are covered by a single monthly payment. Our customers own the solar that comes out of it and pay for the electricity which goes into it, and decide what tariff, if any, to charge their EV drivers.

This is a suitable solution for both freeholders and leaseholders, as it involves minimal upfront costs, no long-term commitment and flexible tariffs that can be easily adjusted based on market conditions. Our business model can be compared to a plant hire business, where we assume the asset risk while customers take on the utilization risk. We mitigate the asset risk by being able to provide the solution to another customer, while customers mitigate the utilization risk through short-term contracts and having control over the revenue.

At the end of the contract period, 3ti will retrieve the unit, refurbish it and make it available for our next customer.

How long does it typically take to get a new installation connected to the grid? Some of the recently quoted times (in years) for new renewable sources seem extremely long.

This can be a challenge with large solar and fixed infrastructure projects. However, our behind-the-meter approach reduces the likelihood of these challenges. It is now common practice to install systems that avoid exporting solar energy to the grid altogether. Essentially, if you can distribute energy within a microgrid without relying on the national grid, the installation process becomes simpler.

For Papilio3 our solar export capability is comparatively small, and by not asking for a new connection and energy meter, we are not usually asking DNO's and energy suppliers to install new capacity, we're using what is already there.

Can you give an indication of broadly the payback period on such a solar installation?

Not exactly, it is dependent on each customer use case, and as we avoid up-front costs the payback period is more or less immediate.

The value of solar generation for Papilio3 is typically around £5,000-8,000 per year, depending on our customer's energy tariff. The revenue model for EV charging also depends on the customer's energy tariff, and the price they choose to set for drivers. Many of our customers have a mixture of free charging (e.g., for fleet vehicles), discounted rates (e.g., for staff), and commercial rates (e.g., for the public and visitors).

Broadly speaking, for typical utilisation our customers need to set an end-user tariff of about 10 [pence] more than they pay for electricity to break even. With our "no up-front" cost business model it is therefore possible to start making returns in month one, and in most cases we see the utilization rates grow consistently over the first six months to a year after installation.

For our larger solar projects, funded under power purchase agreements (PPAs) the savings also appear in month one, with the cost of electricity typically being about 30-50% cheaper than grid electricity.

Are there any geographical limitations on where a solar car park can be installed? Is close proximity to an existing grid connection a prerequisite or, with the use of BESS, can a 3ti installation operate independently of the grid?

Papilio3 is an on-grid solution; there simply is not enough solar generation to provide reliable charging for 12 vehicles all year round, so it needs access to a grid supply. If the supply is too far away, it can naturally get expensive to run cables, but fortunately, most parking is near the building it serves, and we often find existing cable routes can be re-used or re-purposed.

At the moment, we are focusing on mainland UK locations. For most locations, installation is quite straightforward, and we have options such as ballasting, or screw-piles should they be needed for particularly windy locations.

For our mega-watt scale solar car parks the key to commercial success is a local off-taker, i.e., locations with high energy consumption like factories, data centers, leisure centers and so-on. These are places with big car parks where behind-the-meter solar can massively reduce their existing energy costs.

What is the "unexplored middle ground" between domestic and rapid charging, and how can it benefit consumers and EV owners?

At present, EV owners are given three options: charge at home, at work or in public. Home charging

is long dwell, where 7 kW is usually fast enough and many EV drivers can take advantage of special overnight tariffs for the cheapest possible motoring.

However, not everyone can charge at home, not all offices have sufficient infrastructure in place, and not all public charge points are created equal. Many public and street installations still only offer 7 kW, which offers around 30 miles of range per hour of charging (MRPH) or promise "up to 7 kW," which means the load is shared between all users and therefore decreases in power as more vehicles connect.

Installations that offer "up to 11 kW" only give a maximum of 3.6 kW to 7 kW capable vehicles, giving — at best — just 15 MPRH for many modern EVs. For hotels, domestic and airport use, this is fine, but for an amenity charge during the day at work, it is very slow, resulting in EV drivers hogging charge points [and] having to "graze" a few times a week rather than perform a full charge only once a week. Not only is that inconvenient, it also impacts the overall revenue potential for the site.

3ti does something similar, but we offer "up to 22 kW" with an average of 14 kW per charge point. Most full-electric vehicles are capable of AC charging at 7 or 11 kW, but to support both you need 22 kW charge points installed. Furthermore, smart charging regulations restrict daytime charging for workplaces and domestic installations between 8-11 a.m. and 4-10 p.m., to avoid using expensive peak time (and high carbon) electricity. That gives a daytime window of just five hours where EV charging is "grid friendly" — not by coincidence — [at] times of the day where there is usually the most solar energy available.

Not only does Papilio3 offer this faster charging rate, our solar, "3tiG" smart controls, optional battery and potential grid service offerings help alleviate typical power constraints which simply cannot be avoided with basic EV charging installations alone.

Without doubt, workplace and destination charging represents the cleanest, most convenient and most cost-effective alternative to home charging for a fairer, faster, cleaner energy transition. This is the middle ground that, until now, has been largely overlooked due to some of the technical and commercial challenges outlined above, and avoided with Papilio3 and 3tiG.

What role do you see renewable energy generation, such as solar panels, playing in the future of sustainable transportation and EV charging?

Solar is the cheapest, cleanest form of energy generation and putting it into cars, when and where they are parked just makes sense. Digging energy out of the ground, wasting a lot of it moving it around, and wasting even more refining it so it can be burned, and wasting more again in inefficient thermo-electric generation plants simply does not. Times have changed, and solar is the best form of democratized, decentralized and decarbonized energy. Wind farms are great too, but it is much harder to have your own.

There are significant financial and efficiency advantages to reducing how far, and how often, we move that energy around. Solar and storage offer lower operational costs compared to traditional fossil fuel sources, once infrastructure is in place, and the cost of infrastructure is now many times lower than ever before.

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