

TOUR DE SAHARA 2011

With Pedelects and Solar Trailers Through Morocco

In February 2011, journalist and Pedelec Adventures initiator Susanne Bruesch and German electric bike dealer Sebastian Plog set off on a cross-country expedition through Morocco's spectacular desert and alpine landscape to show what's possible with speed pedelecs. Their "Tour de Sahara" took them on a trip of almost 2000 km (1243 miles) over the Atlas mountains and through the Sahara desert on 45km/h (28mph) pedelecs towing solar trailers to recharge the batteries.



We parked our car in Casablanca and assembled the first two speed pedelec prototypes labeled "Snaky". The guards at the parking lot watched every move and were obviously amused—and surprised as we sped off on our first city cruise. During rush hour we convinced ourselves that the speed-pedelects powered by 250 watt (nominal power) hub motors were well

capable of leaving cars and mopeds behind at green lights ...

In the bustling old town of Marrakesh, we sneaked through the narrow, crowded alleys (Souks) packed with carpets, textiles, pottery, handcrafted souvenirs, Arabic sweets and active dealers and started looking for a new challenge to top this one.

Next stop: Ouarzazate, south of the Atlas peaks. Western cultures have left their impact on this friendly Arabic town, chosen by Hollywood as a setting for numerous movie productions. The spectacular scenery, a delta where mountains, canyons and desert meet, was an ideal start for our first multi-day trip to test the Snaky pedelecs in rural areas (without trailers at first).



Source: Google maps

We traveled 300 km (186.4 miles) south-wards to Mhamid near the Algerian border in weather perfect for cycling. The test reached a new stage when we later took off from Ouarzazate, pulling solar trailers on a stage of 600 km (372.8 miles) towards the Atlantic in the south-west.

SNAKY MEETS CAMEL

Besides drawing attention to how much fun electric mobility can be, the goal of Tour de Sahara was to introduce the new Snaky brand and test the first prototypes under

extreme conditions before serial production. The first models are expected to be ready for sale in Summer 2011 at the EE-Bike Kompetenzzentrum in Lippersdorf close to Jena, Germany. Tour de Sahara partner Sebastian Plog runs this specialized electric bike center.

Our hardtail mountain bikes were equipped with a new generation of GO SwissDrive hub motors developed by a German engineering team and manufactured in Switzerland. Once in serial production the manufacturer will offer a complete drive system with Varta Microbattery lithium batteries. As an interim solution we carried one 576 Wh lithium-iron-phosphate (16 Ah, 36 V, 6.3 kg) battery from China in an Ortlieb pannier and a 432 Wh (12 Ah, 36 V, 2 kg) spare battery on the other side of the rear rack.

The paved road from Ouarzazate down south climbs to an altitude of 1,600 m (5,250 ft) several times with inclines of 6 to 12 percent. This was no problem for the bikes even though we rode at half motor power only to extend the range. After 90 km (55.9 miles including approx. 25 km / 15.5 miles uphill) the 16 Ah battery was finally empty.

While moving south, the scenery changed. A single lane country road with hardly any traffic crossed wide



desert-like flats and a canyon cliff now and then. We moved forward at a traveling speed of around 30 km/h (18.6 mph) on more or less flat terrain and covered between 140 and 175 km (87 - 108.7 miles) per day (with a lot of picture stops).

The great thing about speed pedelecs is that they enable much longer distances. Compared to a normal trekking bicycle, traveling speed is about 8-10 km/h (5-10.2 mph) faster, which means, you can travel many more kilometers in the course of a day. Uphill riding and kicking off with heavy luggage makes life so much easier on a pedelec if the motor steps in as soon as the rider starts pushing

the pedals. As I convinced myself in Morocco—a good speed pedelec is definitely worth its extra weight.

What the electric system really does for the rider became even more obvious when we switched off our motors on a fairly steep incline. By then we were used to extra 250 watts, so riding without the motor wasn't fun. Nevertheless the bikes still functioned pretty well.

BIKES AND MOTORS SURVIVE TOUGH TEST

Back in Ouarzazate we kept souvenir dealers Smail and the crew of Hotel du Vallée busy with test rides and helping us to assemble the solar trailers. These were custom-made for Tour de Sahara by the German company Altec. The trailers, camping equipment, and two more spare batteries increased our load through the mountains from 30 kg (66 lb) to 100 kg (220.5 lb).

Again, the propulsion system withstood all challenges: Inclines of up to 14 percent, strong head-





winds, mostly poor road surfaces and heavy loads—all at the same time. After reaching the mountain top the motors were not even hot when touched.

The power package in the rear hub also proved to be very reliable on tricky off-road sections, which we checked out in a 60 km (37.3 miles) circle close to Guelmim on the West coast. When balancing with pedals, brakes and gears on difficult trails, the motors kicked-in in perfect harmony with the muscle power.

On the entire trip we had no major technical problems. Small failures could be solved on the spot or improved after the tour.

BENEFIT OF A SOLAR TRAILER

The greatest benefit of pulling a solar trailer through Morocco was the attention it got from the locals and travelers alike. People would stop us in the middle of the road to ask questions about the project and the technology. Others took pictures as we passed.

We enjoyed the direct contact to the locals a lot when we were sitting on the bikes, sweaty and dusty. It felt so much better than getting off the car and immediately being regarded as rich western tourists.

One day the Vice President of the Akka region in Central Morocco, Boujemar Tadoumann, stopped

and invited us to visit him in Akka. He wanted to learn more about the solar technology. As the man in charge of tourism development programs in five regions he proudly showed us a brand-new campsite with solar energy powered motel to be opened in spring 2011.

His family's guest house, where we stayed over night and felt kind of lost in a building for 200 people, has a problem with its electricity supply. No wonder the gentleman was so interested in solar technology. He was not the only one who actually wanted to buy the pedelecs and trailers right away.



Each trailer was equipped with 1.5 square meters of solar panels to charge the spare batteries while riding. On a fully charged 576 Wh battery, bike and trailer reached around 50 km (31 miles) including a few uphill stretches. The solar panels helped to charge 50-70 percent of the energy we needed for daily rides of 60 - 150 km (37.3 - 93.2 miles) with the trailers.

Since the insulation angle was suboptimal, it took over 10 hours to charge a battery with sun power. Consequently, we had to additionally recharge the batteries at power outlets during the night, which was no problem in Morocco. For both, solar charging and recharging at electricity outlets we used Sunload mVelo travel chargers which are extremely small and light weight.

It should be possible to charge the batteries fully on the kind of tour for which the solar trailers were originally constructed—mostly flat roads rolling south on good surfaces. However, Tour de Sahara took us over Morocco's mountain roads where we tested this new system under more rigorous conditions. A major reason for us choosing this route was the escalating political protest in Cairo, Egypt, where the tour should have originally started.

Although we hardly noticed the trailers on the flat, they slowed us down to around 10 km/h (6.2 mph) on steep inclines. Downhill rides were as fast as 60 km/h (37.3 mph).

To sum it up, a solar trailer makes good sense for mainly flat travel surfaces lacking a reliable supply of electricity outlets. In mountainous regions, where other means of electricity are available, the heavy weight of trailers as ours neutral-



ize the benefit the electric drive system actually brings. One would be better off using flexible solar panels, thus significantly reducing the weight of the trailer, or by recharging in hostels at night or in restaurants during lunch breaks. A lighter trailer, however, is a great companion for remote areas for complete independence from urban infrastructure.

By Susanne Bruesch

More details and photos on the German web blog:
www.tour-de-sahara.com

