



## GERMAN TECHNOLOGY AT THE SERVICE OF AUTONOMY

**Undoubtedly, one of the most fundamental questions concerning caravanning is the degree of autonomy of the electrical energy source. We know that all recreational vehicles, from the smallest to the largest, have an electricity reserve stored in one or more batteries. Yet every caravanner still feels some anxiety at the thought of losing electrical current when camping in autonomous mode.**

Text and photos: Paul Laquerre

**The RV user** can now rely on various means of replenishing the energy it draws from its batteries. Today we present the most recent advance in this field: the fuel cell.

### Serendipity

In late autumn 2010 at the Recreational Vehicle Industry Show in Louisville, Kentucky, *CampingCaravanning* discovered the German firm SFC Energy. This was its first appearance at the North American RV trade show, with the aim of educating the industry on a new way to recharge the batteries of a recreational vehicle: a fuel cell named Efoy.

Always on the lookout for new products and highly intrigued by this one, the magazine's team was more than happy to converse with representatives on site and learn more about this innovative technology. To distinguish themselves from other companies operating in Louisville and to attract attention, the SFC Energy experts chose to wear traditional Bavarian dress: golf socks with braced shorts and an embroidered shirt. They couldn't go unnoticed!

## A revolutionary technology

Everyone knows that Germany has a well established product reputation. We need only cite the prestigious names of Mercedes-Benz, BMW, and Volkswagen in the automotive field or Carl Zeiss with respect to the best cameras. But this ingenious people have added another string to their bow. For over five years now, the Efoy fuel cell's popularity has continued to grow in Europe, particularly among caravanners.

You don't have to be trained in the principles of physics and chemistry to get an idea of how a fuel cell works. Let's just say that a liquid introduces a chemical reaction within a fully automated device. In the Efoy, it is methanol, better known in Quebec under the name of wood alcohol, which is decomposed according to the DMFC (Direct Methanol Fuel Cell) technique. Without noise or odour or heat, this chemical reaction produces the electricity delivered to the RV batteries. The sole discharge in this process is a little water dripping out of a small transparent tube.

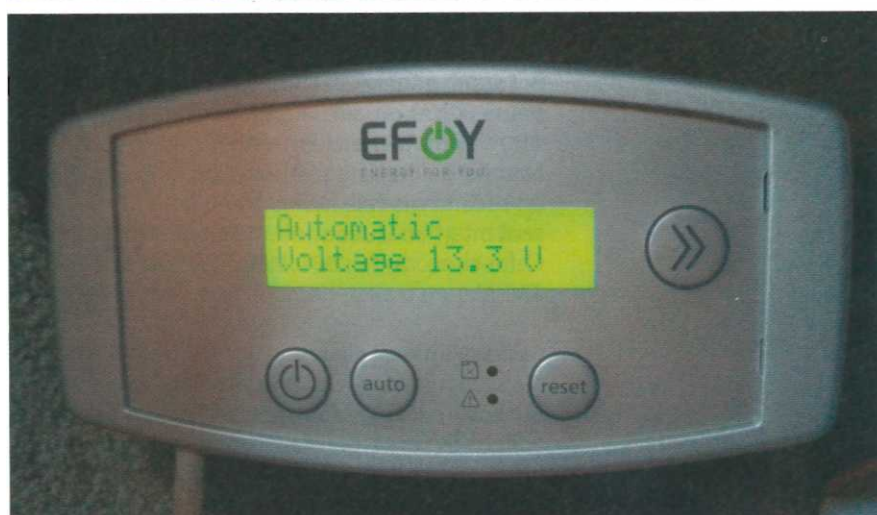
## A compact device

Although there are two Efoy models, our test was conducted with the most powerful model, the 2200, newly available in Canada but for sale in Europe for nearly three years. The device is housed in an elegant grey box 43.5 cm long by 20 cm deep and 27.6 cm high. Its small size, as well as its light weight (7.6 kg), allow it to easily fit into most trunks, regardless of the RV type.

The device is equipped with two important accessories. The first is a translucent tank containing 10l of methanol for supplying the fuel cell. The second is a small monitor connected to the device by a long Ethernet-type cable (rj-45), which provides different information about the cell's operation, and means it can be installed in the interior in a easy-to-consult location.

## Installation

Installing an Efoy battery is within the capacity of virtually any caravanner. After determining where it will be located, preferably near the batteries it will power, the caravanner only has to follow the very clear instructions accompanying the fixing set supplied with the device. The two wires leaving the battery must be connected to the negative and positive battery terminals.



The installer has to first pierce a hole in the trunk in order to insert an exhaust pipe for the small amount of heat produced by the battery and provide an output of a few millimetres for the drip hose that lets the water drip onto the ground. This done, all the installer has to do is to route the Ethernet cable up to the monitor inside the recreational vehicle.

## Operation

After pressing the start button, the Efoy battery is so silent that you can forget all about it. In fact, the only noise it emits is from a small fan similar to that of any personal computer.

Peace and quiet is not the only difference between a fuel cell and a conventional generator. In contrast to the latter, the Efoy remains odour free, even when

operating at full power. The same conclusion is reached with respect to air quality since the fuel cell does not emit any pollutants into the atmosphere.

In addition to these three qualities that render the Efoy usable anywhere and at anytime, it makes short shrift of the time restrictions imposed on the generators in several locations, as this fuel cell operates in a fully automated manner and requires no maintenance.

The battery starts when the battery level drops below 12.3 V and ends when the voltage charge reaches 14.3 V. Once this level is reached, the device automatically returns to standby mode.

The fuel cell produces a significant amount of energy. The model we tested generates 2,160 watt-hours (Wh) or, if preferred, 180 ampere-hours (Ah). Note that there is also a second less powerful model offered in Quebec, the 1600. It produces 1,560 Wh or 130 Ah.

#### Some comparisons

If we exclude the small wind turbines, a rare device in the recreational vehicle world, there are presently three ways to recharge batteries: generators, photovoltaic cells (solar panels), and fuel cells. Below we compare the quality and performance of each of these.

The generator, available in a very wide power range, produces electrical current on demand. This means that you must start it as soon as you need energy, for example, to prepare meals. In operational mode, the generator provides the energy needed and recharges the RV batteries. On the other hand, it's noisy, emits an unpleasant odour, and releases polluting gases into the atmosphere. To operate properly, the generator requires regular maintenance and adapts poorly to prolonged periods of non-usage.

As for the fuel cell, it proves less efficient than a generator, but has the advantage that it can be used anywhere and in all weathers. Ecological,

non-polluting, silent, and maintenance free, it doesn't need to be started manually as its operation is automatically determined by the voltage state of the recreational vehicle's batteries. Rain or shine, day or night, the fuel cell is unaffected by conditions and works tirelessly.

In addition to these advantages, the fuel cell possesses the singular quality of being movable. Unlike solar panels that involve the permanent modification of the RV, the Efoy battery can easily be transferred from one vehicle to another. Its almost infinite life, given that it only needs a little fuel makes it very interesting when the time comes to change the recreational vehicle.

In addition, it is not necessary to add more batteries to your RV to have energy because the fuel cell operates as soon as the voltage drops, ensuring that there is always energy available.

Solar panels do however prevail on two levels. As they draw their energy from the light, they require no fuel and produce no noise. But their energy intake is limited to daytime and varies greatly depending on the degree of sunshine and their position. A shaded location, dirt, or leaves on the solar panel are all factors that reduce its performance.

As solar panels only generate energy for a few hours a day, the amount of energy available in the evening will be directly proportional to the reserve collected during the day. This quantity of stored energy depends on two conditions. Firstly, the greater the number and power of the solar panels, the greater the energy produced. Secondly, the number of batteries becomes a critical element, because once all the batteries are fully filled, the excess energy produced by the panels is discharged. Yet, the presence of multiple batteries adds a significant weight, a disadvantage given the limited loading capacity of a recreational vehicle. This addition therefore has a direct effect on the quantity and weight of other luggage or accessories that you wish to take with you.

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## Which RV type is it suitable for?

First developed for the European market, the Efoy battery is now taking on America. Yet, the RV market as we know it here is very different from that across the Atlantic. Let's face it, we are major energy consumers. Our large sized vehicles have a huge amount of apparatus for which electricity is essential: microwave oven, toaster, water heater, refrigerator, hair dryer, multiple televisions and digital decoder, washing machine, air conditioners, to name but a few. Of course, all these accessories add to those operating on DC (12 V).

Due to these factors, we are inclined to think that the target best suited to the fuel cell would be small recreational vehicles. On the one hand, they often have less energy accessories, but they are also more vulnerable to constraints in terms of storage and weight.

Imagine a tent trailer, an ultra light caravan, or a lightweight class B motorhome that could, thanks to a fuel cell and battery current, see a sharp rise in its autonomy.

For those traveling in these RVs, the Efoy makes a very attractive option. It is only necessary to make room for the battery and its reservoir, which can remain for long periods in standalone mode whilst providing the assurance of always having energy. During our test, we found a container of 10l of methanol was sufficient to operate the fuel cell for 160 hours. Since the fuel cell goes into standby mode when the battery is fully charged, the amount of methanol could provide almost a month's autonomy before the tank is empty.

Incidentally, the current price of 10l of methanol is \$50. A somewhat high price, as this fuel for the time being, has to be imported from Europe. We hope that SFC Energy will find a local supplier in the near future, which could lower the fuel price.

Recreational vehicles are not the only ones that can enjoy the benefits of an Efoy battery. Take amateur sailors who, by evening, will have all the electricity needed without having the silence of the place marred by the annoying noise and smell of a generator.

People who own a chalet that isn't connected to the electrical grid would also benefit from considering using the fuel cell to meet their needs. Even in their absence, some essential appliances could continue to operate.

Performing perfectly and presenting some undeniable qualities, the Efoy fuel cell is a very innovative technological response to our electricity needs. Newly introduced to the market, it nevertheless has a serious drawback; its sale price. Paying \$6,000 for an accessory, efficient as it may be, constitutes a major obstacle for the user that is best suited to take advantage of it, the owner of a small RV.

Of course, like any new product, the Efoy will begin by seducing the converted to a more ecological way of providing energy. In time we too, like the European caravanner, will probably opt for this product in greater numbers, which we hope will have a downward impact on its price.

We would like to thank Horizon Lussier who lent us this accessory and also performed a flawless installation.