

Tss4U provides solar energy in combination with wind energy

## Shell and NAM enthusiastic about the initial findings

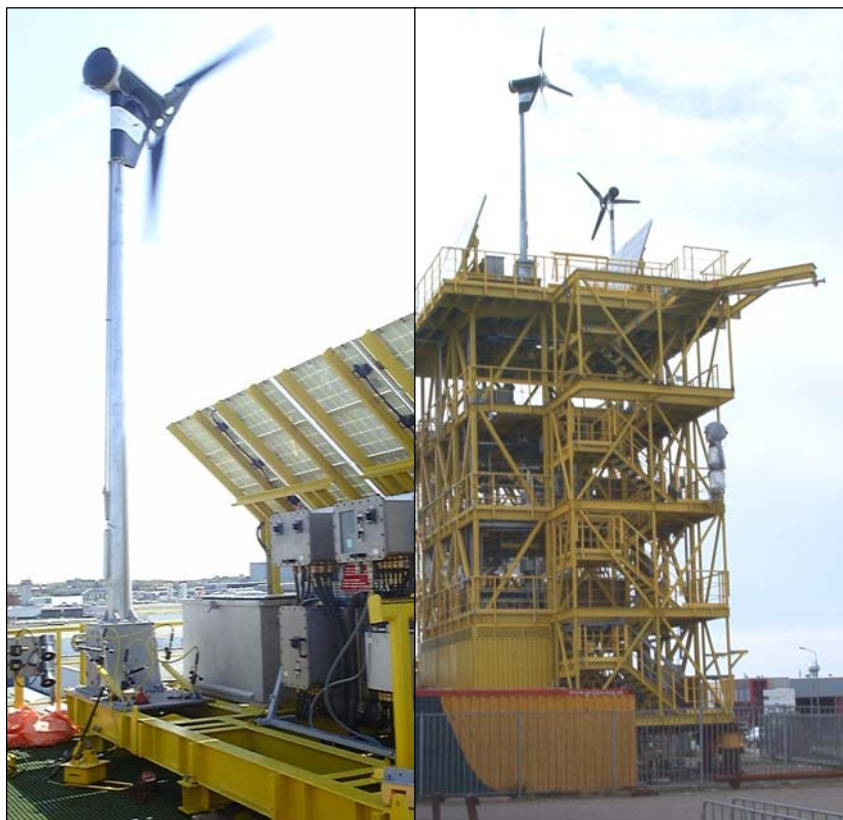
For centuries, we have been digging for oil and gas, whilst the sun provides millions of kilojoules of energy each day. With the current, high global energy consumption, it is expected that petroleum and gas will start to become scarce in around forty years time. The sun radiates energy to the earth in the form of light and heat. Green plants are able to catch this sunlight and, via a complex system, convert it into energy-rich sugar molecules. How would the offshore industry be able to convert solar energy into, for example, usable electrical energy? Innovative solar cells offer a solution. Offshore Visie spoke to Tss4U – THE solar solutions for YOU.

Tss4U in Veldhoven, the Netherlands, is specialized in supplying onshore and offshore solar energy systems. Its customers include oil companies in the Middle East and the Far East, as well as customers closer to home, such as Shell UK and the NAM. Since 2003, the company has been closely involved in the engineering, design and supply of the *renewables* (RE) package for the Cutter and K17 platforms. This concerns hybrid solar-wind energy systems - the only ones of their kind in the world. Tss4U expects that, in the future, the systems will become an excellent alternative to

the current method of providing power for unmanned platforms in the North Sea and other areas with a similar climate. Solar energy, in combination with wind energy, is useful in areas where the sun does not shine very much, because even if it is cloudy, the solar cell still works. Clouds only block some of the sunlight, the rest gets dispersed. On the French Riviera, for example, where it is much less cloudy, the sun provides only 1.5 times as much energy as in the North Sea.

**Use**  
Tss4U, which is now ISO 9001

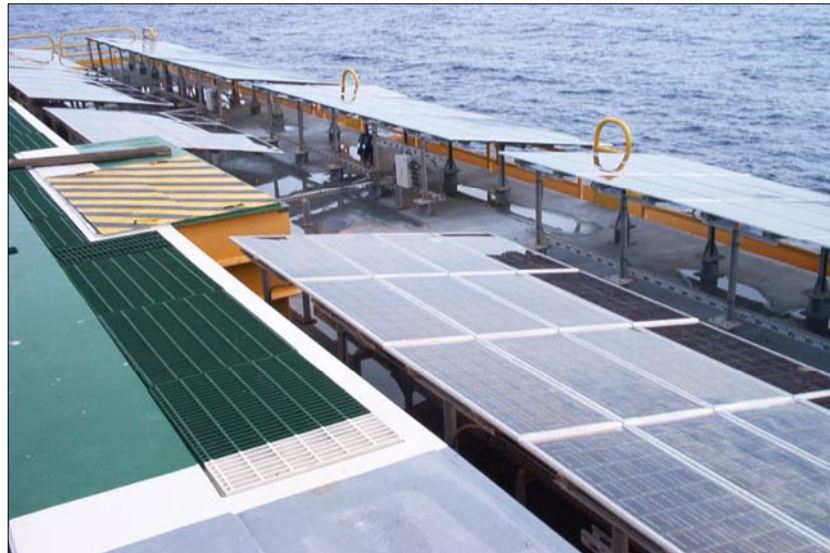
certified, was established 2½ years ago by Remco de Vries (Research, Development & Engineering), Jan-Willem Linsen (Projects) and Jan-Willem Hendriks (Management). Although it is still a young company, the three of them have many years of experience in the field of generating electricity with the aid of solar panels. Remco de Vries has more than 20 years experience in this field, first at Holec and then at R&S, the part of Shell which started using photovoltaic solar energy, also called PV, in 1984. This is the environmentally-friendly way of generating electricity from sunlight using solar panels. At that time, Shell Solar had a factory in Helmond, the Netherlands, where they built the panels. Jan-Willem Linsen's and Jan-Willem Hendriks' roots also lay at Shell Solar. At the end of 2002, Shell Solar decided to close its branch in Helmond. Solar panels can be found in many different places. They are often used in locations where there is no other source of power supply. Most solar panels are made from silicon, a semiconductor, whose atoms sit in a sort of diamond-shaped grid. A special property of semiconductors is that the atom bonds can be easily broken, even at room temperature. This releases electrons, so that the material conducts electricity. There are three areas of usage, namely solar energy connected to the mains power supply, rural electricity (mainly in developing countries) and truly autonomous systems for industrial uses. De Vries said, "They are used in situations where a small quantity



of electricity is needed and where there are no plug sockets at hand. For example, we supply our products to oil and gas companies, as well as telecommunication companies. They are used along pipes which run through deserts or forests in very remote areas. The electricity is needed for cathodic protection, measurements, control activities and telemetry. The same is true for offshore production platforms. In these cases, it is slightly more complicated, since the solar panels must be explosion-proof, although their uses are almost always the same, namely emergency power supplies, navigation lighting, instrumentation, that sort of thing."

### **Knowledge**

Tss4U currently has five employees and can also count on the support of a number of experienced, former Shell employees. The advantage of this group of people is that they know what they are talking about, because they know the product. De Vries said, "You cannot learn this trade at school, because there is no specific education. Our school is the real world. This means that we are self-made. If you have an electro-technical background, then it will take you at least two years to gain knowledge of solar energy systems. You must know the background of the generation of energy, you must have knowledge of the systems and you must, of course, know their uses. You must also be able to calculate how many panels are required and how many batteries are necessary for a certain use. We consider this educational fact to be a disadvantage when searching for and recruiting new personnel. They require at least two of years training. It is for that reason that we are glad that we can call upon our former colleagues from Helmond. During acquisition interviews, you also notice that the people who are interested in using the technology do not always have sufficient knowledge of our field of work. The possibilities and the impossibilities are often not completely clear to people. It, therefore, requires an extra explanation on our part to arrive, together with a potential



client, at an optimal list of specifications for this alternative form of energy."

### **Dimensioning**

Tss4U's core business is to calculate how many solar panels and battery capacity a client requires based on its energy needs. "We guarantee that a client will receive the energy that he requires", said Jan-Willem Linsen. "We distinguish ourselves through our knowledge of applications and we are able to offer clients a suitable solution for their electricity problems with the aid of special simulation software. The client always has a certain energy need and, depending on the customer's location, a certain number of solar panels will be suggested. This is called the supply capacity. The energy supply also has to be reliable. You must calculate your system dimensions so that they meet the reliability that is demanded for the energy supply. On an oil platform, the energy supply must never fail. You, therefore, look at the weather information over a long period of time in a certain area, search for the worst case scenario and base your dimensions on that. The conditions in the Middle East and Far East are, of course, very different to those in Western Europe. This is also the reason that the use of solar energy is relatively small here. It is particularly difficult in cases where a lot of energy is required. This has to do with the climate. We sometimes have days where there

is a lot of sunlight, but it varies too much from day to day. In the summer on the North Sea, there is ten times as much sunlight as in the winter. That is a very large difference. This means that, for constant use, there must be substantial over-dimensioning for the winter period. This makes it more expensive for the oil companies and, therefore, less attractive. It is not such a big problem for small uses. In principle, solar energy is always the cheapest way for the customer to have electricity, even in extreme cases. Only, for offshore uses, it is not always practicable, for example, due to the lack of space on a platform."

To illustrate, it costs approximately €22,000 in the Netherlands to have 1 kilometre of electricity cable laid in the ground. For the same amount, 15 solar panels can be installed which can then be used to continuously generate dozens of Watts of energy.

### **Knowledge**

After establishing the company in 2003, the three solar energy specialists immediately concentrated on the international offshore industry. They have been successful, because the number of systems sold is still steadily growing. Tss4U has now supplied approximately forty complete solar systems throughout the world. Each system is an independently working construction of solar panels, battery regulators and everything else that comes with it. "Our solar system can be

compared to a generator”, explained Remco de Vries. “Our zone 1 explosion-proof, certified system is, therefore, often used instead of a diesel generator. At one point, though, the number of solar panels becomes so large that it would be better to use a diesel generator and employ a maintenance engineer. For offshore use, the turning point is a system with a maximum, continuous supply of 3,000 Watt, or 3 kW. For onshore use, the turning point is a continuous supply of 10 kW. We began in the offshore regions of the world where there is a lot of sunshine. Our first systems went to the Middle East and the Far East. We had built up a considerable network in that region in the past. It was initially difficult to gain the trust of the clients, but once we had proven our reliability and that we could guarantee continuity, that problem was soon overcome. Even during the initial stages, the knowledge that we already had appeared to be particularly decisive. We have a number of competitors in the international market. Everybody knows their own domestic market, but only a few have the international knowledge of the business which we have concerning explosion-proof, certified systems.”

### **Trial**

After supplying systems to the Far East, the Middle East and Nigeria, Tss4U made the hazardous leap towards the North Sea last year. It was not exactly a leap into the dark, because, during their Shell Solar period, the three colleagues had already been involved in searching for an alternative to a sea cable and/or diesel generator. De Vries said, “Once we had our own company, we met up with Shell to discuss a combination of wind energy and solar energy. This resulted in a trial system on an old North Sea platform belonging to Shell and ended in delivering the systems to the Cutter and K17 platforms. The problem on the North Sea is that there is hardly any sun in the winter. Buoys and navigation lighting can be electrified with solar panels, because they only require a very small amount of energy, but

installing solar panels on a platform in order to provide 1.2 kW of continuous power was impossible, because of the simple fact that it would require an area equal in size to half a football pitch. It is for that reason that during the trial, we carried out a large number of tests with a certain type of windmill from Proven Engineering in Scotland. During the test period, the windmill was altered in such a way that we can now confidently say that it has been fully optimized for its task. The question remains, though, how much energy can be produced from a combination of the sun and the wind on the North Sea and how do you successfully combine the two? We have spent a lot of time looking for the correct answer. A number of new mathematical models have been made and a number of extensive measurements have been taken. Thanks to this research – which was carried out with the support of Shell and the NAM – we have gained a great deal more knowledge, so that we are now able to install a very reliable energy supply system on an unmanned platform in the North Sea. A system consists of two 2.5 kW wind turbines, 50 m<sup>2</sup> of solar panels, a reasonably large battery and the rest is identical to the systems that we have supplied to other parts of the world. The systems on the Cutter and K17 platforms are, as an extra feature, located on a skid. The components come as a kit and can be removed from the platform in one go. This concept has been used in order to allow the maintenance, in particular, to be carried out more safely and to allow the components to be replaced quickly, if necessary.

### **Dual**

Shell UK and NAM have been closely involved in the development of the basic design and the final construction of the hybrid energy system. In fact, it was a type of consultancy assignment, for which Tss4U and Orga in Schiedam, the Netherlands, provided a number of components. As was explained in a previous edition of Offshore Visie, Genius Vos in IJmuiden, the

Netherlands, constructed the entire system earlier this year. Remco de Vries said, “What is special is that, as a precaution, both platforms have a dual system set-up. If one system breaks down, then the other system can still provide electricity. In the meantime, we must ensure that the faulty system is replaced or repaired. Furthermore, each battery has a kind of integrated back-up. If there is a problem with a system, the battery can still provide electricity for five days. It is also possible to monitor both systems. We are able to see on the computer in Veldhoven if something has gone wrong and what the problem is. There is also a built-in data logger, which can be used to look at the entire history and to localize a problem. There are a total of 72 solar panels on each platform for each system, including a spare panel and two panels for measuring the sun rays. With the 7,000 Ah batteries that are used, we have installed relatively large units for compensating for certain fluctuations in the weather.”

### **Sunny**

It is difficult to predict what the future will bring for Tss4U, but it will definitely be a sunny one. There is a great deal of interest in the installation of renewables on small satellite platforms. The trend of installing unmanned platforms on the NCP and elsewhere in the North Sea is clearly to their advantage and requests have even been received from the Gulf of Mexico to see whether solar systems can be installed there. Jan-Willem Linsen said, “There are so many factors that play a role in the purchase of a solar energy system. In the North Sea, there are also platforms which work without electricity. They use the pressure which is placed on the well to operate, for example, hydraulic panels. However, we also see that oil companies want to install an increasing number of process computers on board a platform and these require electricity. These companies are our customers.”