

## Interview with Dr. Dieter Otten



**Dr. Dieter Otten**, managing director of the VCretan»Solar Power plant Lassithi Ltd., in conversation with Radio Kreta, <http://radio-kreta.de>

**Question:** *Dr. Otten, what kind of power plant are you and the companies you represent planning for Sitia, the eastern municipality of Crete?*

**Answer:** It will be a »concentrated solar power plant« with a »thermal storage« and a »co-firing unit« for bio-fuels, mainly gas.

**Question:** *What does that mean »concentrated solar power«?*

**Answer:** Well, that is a technology to generate electricity out of the solar heat. It is not photovoltaic. Here you generate electricity out of the visible solar light by using semiconductors. In a concentrated solar power plant big mirrors collect the heat of the infrared rays and focus them on a receiver tube and create temperatures over 500 °C. Via heat exchangers this is converted into hot steam. The steam finally drives a steam turbine like in every conventional plant.

**Question:** *So, you need a turbine for that?*

**Answer:** Yes. It is a special type of turbine that you can stop and start as you like. The advantage of this technology is: in contrast of all other renewables you can generate power with the turbine also when the physical source, in our case the sun is not shining, too.

**Question:** *But how comes this to happen?*

**Answer:** Look, even though the solar input in Sitia is one of the highest in Europa we can harvest 2200 h of full operation in the maximum. With a PV installation this might even be less.

**Question:** *And what is with the rest of 6000 hours of the year?*

**Answer:** Good question. There are in deed 5000 h of more operation that a solar thermal power station can make use of by the thermal storage and the co-firing.

**Question:** *I see. But how to store solar energy? Seems to be quite difficult...*

**Answer:** Not really. We collect the heat, not the light, so we can store the thermal energy, too, like you do in a thermos jug. But we don't store coffee, we store

molten salt. 330°C hot liquid salt is storing thermal energy much better than coffee. Think of the cold coffee in front of you. And now, after the sun is down, we generate steam from the hot salt in the storage, our giant jug so to say.

**Question:** *OK, and how many hours can you save the energy?*

**Answer:** Basically for 10 h but it depends – as always - on the details, significantly on the number of mirrors you have installed.

**Question:** *How that?*

**Answer:** Well, a plant needs a certain number of mirrors for the operation over the day. These mirrors are totally in use for the running turbine. For storing the sun simultaneously in the storage while the turbine operates you need supplementary mirrors logically. More mirrors, however, means more place or better land. But on Crete the land is quite restricted. So, in our case we can install supplementary mirrors only for 3 hours per day - more land we don't have.

**Question:** *Is that enough or is that too small in comparison to other plants like in Spain who store 7 hours or so?*

**Answer:** No, it is not too small. The size depends on how you use the storage. We need it mainly to fill the gaps in the daily sunshine.

**Question:** *Gaps in the sunshine? What does it mean?*

**Answer:** Look, we operate a meteorological research station on our site in Sitia since 2008. The station measures the solar input, the rain, the wind, all relevant weather data. We feed a computer with the data and so we get a full computer simulation of the plant. This simulation shows that we have actually only 120 days a year with full bright sunshine. There are on the other hand about 80 days we cannot operate the solar field because of rain or heavy wind. The rest are days with partly strong interruptions in sunshine which must result in a volatile input of energy in the Grid.

**Question:** *Seems to be not so good for the off-taking and grid managing part, the public power company on Crete...*

**Answer:** You are right; it is close to a disaster. To manage volatile renewable energies you need millions of investment into the grid. Look at the German discussion right now. But poor Greece is not wealthy Germany. You don't have the money here. So, the better solution is what we do: we store the energy and avoid the volatile input. We say, don't use PV use CSP on Crete in the recent situation. You understand?

**Question:** *Yes I do. So, you try to supply power in a steady line to the PPC in stead of volatile curves like PV and wind and make a saver supply?*

**Answer:** Exactly. But gaps in the sunshine are only one problem we have to solve. The other one is do deal with the bad weather on Crete and the night hours. We cannot operate and we cannot store when there no sunshine. This why we have the license to co-fire the turbine when there is no sun and the storage is empty.

**Question:** *Wait a minute; what do you mean by co-firing?*

**Answer:** Co-Firing means that we drive the turbine also with steam that is generated by burning fuels in special Co-Firing Unit, the CFU. Of course only when the sun does not shine. But in contrast to the generic burning of cancer causing Marine Fuel Oil or diesel fuel on the Cretan island we are going to use renewable and clean bio-fuels.

**Question:** *What do you understand by »bio-fuels«?*

**Answer:** Basically this are all fuels made from biomass and or municipal solid waste. Bio-fuels are on the market and traded as commodities. For good prices. At the moment we prefer Jatropha oil, Bio-Ethanol or SynGas which is generated when municipal solid waste is converted in plasma converters to a gas close to methane which is an excellent bio-fuel for CSP plants. But we have not decided what fuel we will use.

**Question:** *Bio-fuels are mostly non-toxic, but Jatropha Oil - we read - is considered toxic, isn't it?*

**Answer:** Yes that's true. But Jatropha is (not very) toxic but only under 50°C. If refined however the oil is heated over 50°C - and no more toxic. If we will use Jatropha, we take of course the refined and not the crude oil, ergo we should use the non-toxic oil.

**Question:** *OK. And what do you mean by SynGas and waste conversion?*

**Answer:** Well, municipal solid waste is an enormous energy resource. But we are so stupid to keep it in landfills and »waste it« (laughs). Furthermore landfills are dangerous places and forbidden by law. What so ever; to convert waste to energy is an easy task now - after years of research and industrial progress. The best way is to collect the waste un-separated, put it into a (municipal) converter unit able to generate plasma heat of 3000°C and to make gas out of it.

**Question:** *But this is a kind of waste incineration, isn't it? A very disputed approach at least...*

**Answer:** No. Don't mix that. Plasma gasification is no waste incineration. The one has nothing to do with the other. Whereas waste incineration is dangerous in deed because of the effects of burning waste at »low« temperatures of about 800°C, the new technology of gasification solves all the problems of incineration totally and completely by the use of the extremely high temperatures. With temperature over 2000°C all dangerous and toxic parts of the carbon molecular chain are annihilated and made to gas, to methane and carbon dioxide. Nothing else. This is really a completely clean and safe waste processing - and a very smart business, too, if you find some one that is going to buy that gas.

**Question:** *Sounds good, but what has this to do with HYPERION 1?*

**Answer:** A lot. Sitia has a big waste problem and operates a very dramatic landfill. If you have ever been there you know what I mean. This landfill is only some km direct line away from the location of HYPERION 1. For several times we have already proposed to convert the municipal waste of the region to gas and sell that gas to HYPERION 1. In the mean time there has appeared already a consortium of companies that offers to build and run such a station for and in the name of the municipality. Our company on the other hand wants to build a small pipeline to the landfill and buy the SynGas from there if such a plant would be constructed here. The premise for a plant should be there - as far as we know. The amount of waste coming from the Sitian region really is enough to co-fire some 200 GWh of electricity. That means, if Hyperion 1 is going to buy that gas from the municipal gas plant with a long term contract for let's say 20 years, this brings millions of Euros in to the municipal budget.

**Question:** *You mean HYPERION will buy all the gas that could be generated from municipal waste, the city gets rid of the local waste problem and will earn millions of Euros by this? Sound like a fairy tale.*

**Answer:** What I say...

**Question:** *And what shall the municipality do with this money?*

**Answer:** I am not a citizen of Sitia, so I have nothing to say. But I consider myself a friend of the people there. And as a friend I think, the money is desperately needed to improve the infrastructure, better schools, better hospital services, better retirements and many things more that are in the benefit of the ordinary people. And the more we co-fire the more we can close the deficit gap of the Cretan Power supply. If necessary we could contribute 600 GWh of electricity a year and close the gap by 30%.

**Question:** *You say, there is such a big gap in the Cretan power supply? Actually?*

**Answer:** Yes, there is such a gap of 2000 GWh per year minimum. It needs 3 or 4 conventional power plants to fill that gap. But PPC and Greek Government seem

not to be financially capable to build that. Foreign investment to build them, due to the crisis is not to be seen. The best chance the Cretans have to solve their power problems is a CSP plant like Hyperion 1 that kills two birds with one stone. Hyperion 1 alone cannot save the whole item but can contribute significantly.

**Question:** *And the proofs?*

**Answer:** Well, there are several international studies about the Greek non connected islands and their power supply system, one even from the Iceland Power Authority. This study for example has stated a gap of 2000 GWh in the year 2020. So, that is what I refer to.

**Question:** *Reading Greek or better Italian internet sources one finds some critical remarks to your project. Some voices there say Crete shall not be the socket of Europe and speak about a new kind of eco-imperialism of mainly German utilities that want to exploit people and environment. What do you answer?*

**Answer:** In my eyes this is nothing but propaganda and not very clever, too. What does it mean to call Crete »the socket of Europe« when you simply cannot export the electricity from the island because Crete is not connected with the mainland. The generated power must forever stay on the island. There is no way out. The Cretan electricity market - by logic – is for the Cretan citizens and their tourist guests, only. And every kilowatt-hour generated here by renewable sources is desperately needed by the Cretan economy.

**Question:** *But why only by renewables?*

**Answer:** Because there is no other domestic source. This is also true in the next 5 years even in the unlikely case of domestic companies finding and extracting oil or gas in the Cretan Sea because of the lack of new gas or oil plants on Crete.

But I would like to bring in another argument about the cited energy imperialism. In my eyes, there really exists a kind of energy exploitation of the Cretan people by foreign forces. But a completely different one and no body seems to see that or to speak about it.

**Question:** *What you mean by that?*

**Answer:** Look, Crete is not connected to the mainland grid – like all other Aegean islands too. The island therefore is completely dependent on oil imports for the power supply. 86% of the power is made from Marine Fuel Oil and Diesel that is imported from Iran and Arab countries. In reality Cretan money goes into the pocket of Multinational Oil Corporations the Mullahs or the Sheiks. That's what I call »real energy imperialism«. RES on Crete are completely the opposite: they are a kind of liberation to ease the grip of the Multinational Oil Corporations. And not to forget: this oil based mono-structure leads to unacceptable high prices in the generation of electricity on the island. The Cretan consumers do not really notice that because the electricity prices are supported by indirect public subsidies. But every kilowatt hour they consume to cook or to turn on the lamp or to condition the air they contribute to increase the deficit and the economic disaster.

**Question:** *But the prices for the renewables are also very high especially by the renewable energy remuneration fees of the Law 3851 you will get for CSP plant. Is that not the same or even worse?*

**Answer:** That is a very interesting point you touch. Yes, the Law 3851 gives the independent power producers of renewable energy in Greece a guaranteed remuneration fee that is taken from an extra charge for renewables added on the normal electricity bill tariff of the consumers. But look, it is an open secret that the Cretan power generation with Diesel or Marine Fuel Oil is far more expensive than the tariffs for the renewables. The studies speak of costs up to 0.35 € per kWh. That means, the price for conventional power on Crete is probably significantly higher than the price for renewables. But whereas the renewables are transparently sponsored by the consumers' extra charge for renewables the fossil fuels

are inwardly supported by the government, and nobody cares about the 500 Millions Euros that are probably pumped every year in the ailing power supply on Crete.

**Question:** *But that was not my question...*

**Answer:** So, to answer exactly to your question: Renewables are cheaper than fossil fuels or are merely the same - on the short run. On the long run, however, solar power of a concentrated solar power plant exceptionally will be cheaper. We think about price of 0,09 €. That is a cost decrease of 70%. And not forget: this will happen when the prices for fossil fuels will go up in the future.

**Question:** *How that? Where do you get this price fall from?*

**Answer:** After the amortization phase, that means when the loans are paid back, we have only the operation and maintenance costs. The solar energy is for free. Don't forget that.

**Question:** *Let me come to some other critical remarks. What is with the water such a power plant needs and must be taken from the wells in the region so that the power plant will take the water that is needed by farmers and households?*

**Answer:** That is true only if you apply a water-cooling system. But HYPERION will be cooled by air. The water this plant will use is needed for the employees and the washing of the mirrors. In total this is less water than a 5-Star hotel in Sitia is consuming in a year. But since there is a lot of surface water on the plain we have decided to take the water from this source. We are going to capture the surface water in cistern reservoirs like the farmers did in the past. We have found at least one small cistern from the last century on our promise. So, we will take our water not from the wells. We will take it from our cistern system. The good news is that we probably will capture much more water than needed and we can give this surplus water to the farmers around. So, we don't take any water away from Sitia. We do the opposite: we will deliver water to the region when water will be short.

**Question:** *That is really an interesting offset for the people in Sitia, I think. Apropos offsets, you speak about the employees. How many jobs will really be created by HYPERION 1. I ask this, because some sources on Crete put this in question hardly.*

**Answer:** Well, we calculate with 70 employees. In a comparable investment of a concentrated solar power plant in Spain, Andasol 3, there are 55 employees to be found, but the co-firing, which is not part of the concept in Spain, needs about 15 people more. During the construction phase 450 people will be hired for building the plant. Now, if some people say, they know for sure that a solar plant of that size employs normally 2 or 3 people and not more, because they have the information from solar plants of the same size, they confuse photovoltaic plants with concentrated solar power plants. Indeed a PV station employs only a very small number of people. But a concentrated solar power plant is a real job machine.

**Question:** *What is about the argument some people call »optical pollution«. A power plant like Hyperion could have a negative impact on tourism.*

**Answer:** No. There is no »optical pollution«. Look, the plant is constructed on a plain 450 m above sea level. You cannot see it. There are no cooling clouds to be seen over the plant because of air cooling, nothing like that. The plant is hidden behind the mountains and cannot be seen from any point of tourists' interest. The only way to see it is to climb up the hills and visit the plant. And even then it is hard to see because it is hidden also behind fences and trees, we plan to plant.

**Question:** *But there seems to be to a conflict with the project of the Geo Park Sitia. What to you say to this argument?*

**Answer:** We don't see any conflict. A Geo Park - as far as we understand this - is not an area of parkland. It is a normal physical area with some touristic points of interest that demonstrate and illustrate the geophysical character of the region,

the flora and fauna and the history. The premise of Hyperion does not directly belong to the geo park area, as we see it, but we are very much in favour of the geo park idea. Not at least because the use of renewable energy belongs basically and essentially to the geo park concept. A plant like ours should be integrated!

**Question:** *To have a concentrated solar power plant like Hyperion in the middle of a geo park should be considered a godsend. Is that what you want to say?*

**Answer:** Yes, looked at Hyperion in light it can fairly be a light-house of the geo park idea. By the way, we plan to construct a visitor's centre for Hyperion1 with exhibitions, multi media shows and so on. We offer the geo park initiative actually to cooperate closely and to integrate this visitor's centre, the exhibitions and shows into the park concept including financial support if necessary.

**Question:** *An investment like this normally has what is called: acceleration effect. That means other businesses are stimulated, the infrastructure is improved, money comes into the region etc. What is the effect of Hyperion 1 in your eyes?*

**Answer:** Well, there is such an effect at very short hand: the waste to energy conversion facility that is stipulated directly by the co-firing unit of the Hyperion 1 power plant, think in terms of investment, think in term of employment and think in terms of offsets for the municipality and so on. We have discussed that already. And don't forget Sitia will get cheap energy from this plant. This is an argument for the establishment of industries with lots of punch. But the most ambitious side effect we have in mind is to offer 49% of the shares of the O&M company of Hyperion 1 to the municipality of Sitia and we are already in discussion with the government – as a Fast Track project so to say – to find solutions how to make that happen.

**Question:** *You mean, the municipality of Sitia shall be shareholder of the plant? Why do you propose that?*

**Answer:** Yes, we propose a participation of the municipality in the power sector. We have very good experiences with this kind of municipalisation of power supply in Germany. We think due to the fact that the consumers support the renewables with their surplus payment, they should be involved in the operation and the management of the plant. Via their municipality. This is the best guarantee for a consumer-friendly electricity policy in the future. We propose really »power to the people« (laughs). This includes also the financial aspects of a consumer-friendly electricity policy in terms of better municipal infrastructure and so on.

**Question:** *Dr. Otten thank you very much for this interview.*

**Answer:** It was a pleasure.