

EXCLUSIVE INTERVIEW WITH SALT X AND AALBORG CSP: CORPORATION IN ENERSTORE — THERMO-CHEMICAL ENERGY STORAGE SOLUTION

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Reported from CSPPLAZA: SaltX Technology and Aalborg CSP have recently announced their non-exclusive Joint Development Agreement to develop and commercialize an integrated energy storage solution — EnerStore — for Concentrated Solar Power (CSP). Both companies address impassive speeches in China International CSP Station Conference & CSPPLAZA 2017 Annual Conference (CPC2017), held by CSPPLAZA in Hangzhou on June 14th~16th. Journalists from CSPPLAZA therefore interviewed speakers from SaltX Technology and Aalborg CSP for detailed information about their corporation as well as their plan of entering China.

High efficient energy storage has always been considered one of the out-standing advantages of CSP. The innovation of energy storage technology has brought a lower cost and therefore larger profits under current feed-in-tariff. How does the SaltX patented energy storage technology— EnerStore work? What is the difference between this technology and other energy storage solutions currently in the market? In what way can other CSP developers make use of this new tech?

It is widely expected that CSP industry in China will meet an unprecedented bloom in the next decade. While the flourishing future attracts plenty of overseas companies, many of them fail to participate in projects in China more deeply. How should an international CSP developer enter Chinese market? What are SaltX Technology and Aalborg CSP looking for in China?

Answers to be found in the following interview record.

EnerStore – a thermo-chemical energy storage solution



Image: Christofer Rhén, Vice president of SaltX Technology (Sweden), is interviewed by CSPPLAZA journalists

CSPPLAZA: Would you please introduce to us your EnerStore? How does it work?

Christofer Rhén: Of course. In the CPC2017 we have explain to hundreds of audiences how the system works. EnerStore stores heat from any energy source — in CSP's case it is thermal solar energy — and releases the energy when it is needed. It is very much like a battery. To put it in a simple way, we have two chambers containing water and salt. When the first chamber is heated with 500

°C, water and salt are separated, creating 150 °C steam going to the second chamber through a tube. By this, energy is stored in the dry salt. When the energy is needed, we open the valve between the chambers and reunite the water and salt. There will be a thermo-chemical reaction when the water goes back into the salt, and energy (heat) at 500 °C is released. This heat can be utilized as steam for electrical power production for example.

The storing and releasing cycle occurs in a vacuum system so that the procedure can be repeated without changing the salt's characteristics, which also brings down the maintenance fee. The solution is scalable, very energy efficient, environmentally friendly and cost effective.

Image: Mr. Christofer Rhén from SaltX Tech and Mr.Yaou Wu from SunCool are demonstrating how the EnerStore works to CSPPLAZA
journalist by a demo model

CSPPLAZA: To CSP industry, every bit of thermal energy counts. How will you use the thermal energy in the 150°C steam generated during the charging process? May we ask what direction are you going?

Christofer Rhén: That is what we are doing together with Aalborg CSP under our non-exclusive Joint Development Agreement. To find the solution of using the 150°C steam, we need an overall energy storage system engineering design, that now is in development. We are currently setting up the system with our partner Aalborg CSP. SaltX has outstanding control of salt treatment and water direction. Applying our IPs (intellectual property), and together with Aalborg CSP, we will build an efficient system and develop it into a ready solution for the market. The solution will come out in half a year or so.

CSPPLAZA: Thank you for your explanation. We know that lots of Chinese companies also provide salt technology for energy storing, what is the difference between your tech and theirs?

Christofer Rhén: The other salt techs now existing in the market are sensitive storage systems. You heat up the stone, sand, or other items till their temperature reaches the operational one, usually it is molten salt in CSP systems, and then the thermal energy is stored and ready to be transmitted physically. But with EnerStore you have a chemical reaction in the system. The thermal energy is stored chemically and that is the difference. This implies several advantages giving higher efficiency.

EnerStore is a thermo-chemical energy storage solution with higher volume effectiveness and less cost than its competitors and can offer customers tremendous yearly savings, a short payback time and a sustainable solution.

Non-exclusive Joint Development Agreement

CSPPLAZA: Several days before the CPC2017, you released announcement about corporation between SaltX and Aalborg CSP based on a non-exclusive Joint Development Agreement. Why did you choose each other?

Jan Kragbæk: Our corporation is based on the mutual awareness that the two companies can together expand a larger market. SaltX has outstanding control of the energy-storage technology and Aalborg CSP is a leading developer and contactor of CSP stations. We have been focusing on the design and installing of CSP stations since 2007, and have delivered over twenty CSP projects in Europe, MENA, Asia and Australia. Together with SaltX, we are able to deliver a CSP or relevant hybrid-energy solution with higher storage efficiency for our clients.

Image: interview with SaltX Technology and Aalborg CSP

CSPPLAZA: When did the talk start? What are the roles played by each side in this agreement?

Christofer Rhén: We have been in contact for about one year. After talking with each other every now and then, we met for a couple of months, and recently we finalized our agreement of the EnerStore technology that we are going to develop together. During this spring, we have evaluated the technical and commercial pre-requisites for collaboration and now we will start full speed ahead of jointly developing a solution that integrates the SaltX EnerStore technology into Aalborg CSP energy systems.

Under the agreement, SaltX will provide cutting-edge energy storage technology while Aalborg CSP serves as developer and contactor of the CSP projects. In this way we prepare our technology and solution as a completed product for the market.

CSPPLAZA: With that being said, what is your next step after the agreement?

Christofer Rhén: Our next step is to promote engineering design on EnerStore and to build the first prototype together later this year. Actually we'd like to further develop EnerStore and build the first prototype with our clients as well, which is what we are looking

for in China, and in all markets around the world —partners or clients that should be interested in this advancing one.

CSPLAZA: Is this the kind of way you want to operate and enter the Chinese market? Why do you choose this way?

Christofer Rhén: That is kind of way we used to do. It is how we do in all markets, not only in China. We provide technology around the salt, and then set to build up the product, to design the energy storage facilities together with our partner. Then we apply our product to a system, such as a CSP system. That is how we are doing in all markets.

Enter Chinese Market

CSPLAZA: We believe there will be and there are clients and partners for you in the fast-growing and promising Chinese market. In case that you need founding or investment, do you think you will accept Chinese money? Do you think there is a way between you and Chinese companies to cooperate with each other, in founding, technology, or anything relevant? Not only for CSP projects in China, but also in other parts of the world.

Christofer Rhén: Absolutely there is and we are totally dependent on such solution as well and therefore we are working hard to do it. SaltX is a well-capitalized company, so we are able to develop the energy solution on our own, but to further implement it and to deliver this first prototype and then commercial ones after that, of course it needs founding and we need partnership for the production etc., here in China as well.

CSPLAZA: Just as you said, you will need partnership and founding in China, but in what exact way will you seek these? FYI, we have heard that some state-owned companies are looking for new CSP techs, CSP projects, CSP companies, etc. to invest on. Have you been talking to any?

Christofer Rhén: No, we haven't done that yet this time, but we did this once before, together with SunCool, the company that my college Mr.Yaou Wu (seated on my right side) is working for.

Mr.Yaou Wu: SunCool is a subsidiary company of SaltX. SunCool currently found a Chinese partner and we are right now in the process of setting up a large-scale production facility in Yuyao (a city in east China). We are very eager to see CSP development in China.

Christofer Rhén: We are doing exactly the same with Chinese companies in building up production facilities in China. And Aalborg CSP also uses this method. They also have production facilities here in China since before, with their Chinese partners in JiangSu (a province in east China). So with the same ways to do but maybe with different, new partners, we will go the same process for this energy storage technology.

CSPLAZA: Could you explain to us how this proceeding work? In the meaning of experience sharing with other companies seeking partnership in China. And in what way can CSP developers make use of your technology, to become your partner?

Christofer Rhén: For SaltX part, we can provide our technology via license. They can buy a license to make use of our tech, or we can share the tech in a partnership where we partly own the company as well.

CSPPLAZA: Talking about your partners in China, we heard that Aalborg CSP begun partnership earlier with a Chinese company located in Wuxi, Jiangsu Province. How is your cooperation with them?

image: Jan Kragbæk, Project Development Engineer of Aalborg CSP (Denmark) Project, is interviewed by CSPPLAZA journalists

image: Jelica Matoricz, International Marketing Manager of Aalborg CSP (Denmark), is interviewed by CSPPLAZA journalists

Jan Kragbæk: It is a company called Livo located in Jiangsu, the province to the north of Shanghai. We have long-term partnership with this company. This company manufactured some of our first CSP components about ten years ago. Our collaboration has now reached a new level in order to supply our Chinese clients more efficiently. We are changing the way we work together now and the new method has proven to be working very well. We are already in final negotiation for some projects and really look forward to seeing what future brings us in this market.

CSPPLAZA: Thank you for your answer. Would you please tell us what is new in your cooperation? What changed?

Jan Kragbæk: Aalborg CSP is based in Denmark and in order to interact with the fast growing Chinese market we had to find a way to reduce the distance between our company and the end client. It was a natural choice for us to involve in the bidding process our long-term supplier with whom we have been closely working together with for the past years. They are well aware of our steam generator

and tower receiver technologies, but also know the local customs and can therefore overcome market and language barriers for us. In the end, it does not matter actually who is approaching the customer because we are both getting the contract. This way, we are complementing and strengthening each other, so that is what has changed.

CSPPLAZA: We've seen the 20 first batch CSP demonstration projects in China launched out and Aalborg CSP have been in the bidding competition for one of them(GuoHua), though the bidding winner remains concealed — GuoHua project has been suspended — do you have future plan to further participate in the 20 projects?

Jan Kragbæk: Of course. We have been looking into different projects. With our partner we have selected some specific projects to target at. Again, because the Chinese market is very different from other established CSP markets. For us, it doesn't actually matter whether it is tower or parabolic trough plant. We mostly work on steam generation at the moment in China and that can be applied to both tower and parabolic stations. But we focus on some specific clients with whom we came through. We are very happy about that and we are looking for the future of CSP business here in China and see if we can get a larger share of it.

CSPPLAZA: So will the joint company of you two find a project or do you plan to develop this technology with another Chinese partner?

Jan Kragbæk: It depends very much on the projects. It is difficult to know how the consolation would be, what the size, or other components would be.

Christofer Rhén: But of course we will be very open, we would be glad to do this kind of demonstration projects in China. We are hearing about the 20 demo projects you are having here. I will be very glad to be in contact with them to see if they are interested in our technology, if our tech would fit in and be tested in these ones. So for sure SaltX is very confident. I think together with Aalborg CSP, we will find good solution for Chinese market.

CSPPLAZA: How would you comment on the necessary that Chinese projects apply oversea technologies or Chinese companies cooperate with western companies in CSP industry?

Jan Kragbæk: CSP is a new way of generating electric power in China but it has been working well for decades in Europe and the US. To realize the expected future in the Chinese CSP industry, I think Chinese companies should select and learn from the best technology, design and construction practices and from these predecessors. Nevertheless, with all companies coming into the Chinese CSP market looking for partners, it is very important to observe who really has the good experience and relevant projects in operation that you need.

All information collected from the interview (Hangzhou, China, June 16th), speeches (CPC2017 in Hangzhou, China, June 16th) and official websites of Saltx and Aalborg, not necessarily convey CSPPLAZA's opinion.

About CPC 2017:

CPC (**C**SP **P**laza Annual **C**onference) is an international CSP conference held on each June.

In the three-day CPC 2017, up to **1028** delegates from both domestic and abroad CSP industry attended the CPC2017, which set a new record for the largest participants number of international CSP conference. Up to **63 prominent delegates and leaders delivered speeches** on various sections of CSP industry, sharing valuable information and thoughts under the conference theme “Rise of China: Reestablish a New Landscape of Global CSP”. Up to **67** exhibitors displayed their products, technologies, and solutions in the 1500 m² exhibition hall, attracting visitors from all over the world. Moreover, **4** press release meetings for new products and technologies, the first CSPPLAZA Awards ceremony and the CPC2017 dinner party also enjoyed great success.

