Team Liander

Empowering Farmers with Green Data Storage

From left to right: Marc Flachmann, Ramesh Prateek, Silvana Gamboa, Varun Aiyar. Missing in photo: Barend Dronkers

Liander's case focused on finding a solution to transport the 30% of excess electricity produced by PV energy on farms, back to the grid. Normally, in order to transport that energy throughout the grid, Liander distribution system would be installed for € 100 000. Team Liander's goal was to find a solution to transport that energy without the cost and new transport lines. The result: Cloud Farming! Cloud farming refers to the process of using excess energy to power data storage centers in the form of clouds. Each farm would be equipped with individual servers, connected to each other and forming a cloud based data storage system, which would all be centrally controlled.

The implementation of the Cloud Farming solution depends on the Netherlands to build the grid infrastructure that connects data centers together. Currently, there are no data linking cables in place (e.g. fiber optic cables) linking data centers within the grid. The key strength of the solution is the high level of applicability and that energy used to power the data centers is excess energy, made useful. Furthermore, the idea to bring the data centre to the source of green energy has made the concept revolutionary. Marc explains: "usually, we use IT technology to make energy greener, but we actually thought of using the energy where it's produced and bring the IT technology to the source and then combine it so it can be used directly where it is produced."

For farmers, the potential for Cloud Farming is huge. Farmers can use all of the solar PV energy, they can sell data storage for profit and even diversify their business. Also anticipated is the growth in demand for data. Nowadays, 60% of data lies within client storage, and in the future that 60% will lie in the clouds. This means that by 2015, data storage in clouds will be valued at € 300 million. For data service providers, should they wish to engage, the potential lies in the low connection cost and "green storage." At a national level, the solution is interesting for governments in smart cities to be able to connect to rural areas and distribute power throughout. Now all that's left is education – how to educate the farmers so the potential of Cloud Farming is vastly known?

Cloud Farming

"Cloud Farming" started with the idea that energy exists in many forms, from electrons to heat or compressed air. But one of the forms is traditionally overlooked. That is storing "data" instead of energy. With the development of social media and big data systems, it is clear that the demand for data storage is growing tremendously (more so even than energy demand in some instances). By linking the term "Data farm" to the "Cloud", our team proposed a novel business model for supplying data storage demand with a network of distributed data hubs ("Cloud Farms") running on renewable (PV) energy. This removes stress from electricity distribution networks, and converts lower value 'energy storage' into greater value "data storage."

- Barend Dronkers -

Jury NRG Battle Europe Edition 2013:

"Team Liander wants to facilitate energy transition – in favour of photovoltaic (PV) panels at the roofs of agricultural production environments - and support the farmer's commitment to making the Netherlands a little more energy-efficient. One of the interesting features of this concept is the high level of applicability. Also remarkable is the fact that this ICT sector challenge -the need for energy- is dealt with by the energy sector. Usually, it's the other way around." – Roel Croes, Jury member of NRG Battle 2013 - Roel Croes -

Team ROSEN

Turning Desserts into Gold with Silicon Power

From left to right: Koen Hermans, Davide Garufi, Bedashrita Chattoraj, Gautham Ram. Missing in photo: Ankit Agarwal

Who ever thought that sand can be turned into energy? Well, team ROSEN did and took the win this past year at the NRG Battle 2013, with their solution to use elemental silicon as an energy carrier. For this solution they even came up with three business models for Silicon (Si) power: (1) using Si as a base load energy source (2) selling the byproducts of Si (3) distributing Silicon power for heating houses or industrial smelting. This blew the jury's minds – they knew about the conversion process but never thought about turning the carbon based economy to a Si based economy which would create "CO_2 free energy on demand." The solution is feasible, since Si is safe and cheap to transport and there is a low space requirement as Si has a high energy density.

The Key to Success

"One of the key strengths of our team was the way in which we were able to reinvent ourselves, bravely," shares Bedashrita, on behalf of the team. The Battle has allowed them to gain more confidence and network with different experts from educational institutions, companies, research organizations and governments. "Due to our victory, we have received great publicity - online and in print - which affirms that Europe is not only passionate about bringing young minds into problem solving in the energy sector, but help them grow professionally," shares the team. The group remains in constant contact with their case instructors, Marc Baumeister (ROSEN Technology & Research Center) and Marten van der Rijst (ROSEN Europe), while the company investigates their interest to further invest in the idea or on intellectual property rights. In Italy, team ROSEN received such widespread media attention that they were invited to pitch the solution in Palermo to industry and government staff. The team is in processes of finalizing collaborations with ROSEN, academia and other companies supporting the idea in the next few months. They are planning first to see the solution in a lab before scaling the process to an industrial level. Will it only be a matter of time before we see a Silicon based economy? At last, it seems the energy revolution is under way!

The Silicon Solution

First, the solution included using elemental silicon as an energy carrier to form a buffer in the energy system. The excess electrical power from renewable sources can in this way be used to convert sand (Silica, SiO_2) to elemental silicon. The silicon can then be burned like coal to produce a base-load power and is clean since burning silicon does not produce any carbon dioxide and instead, produces silica. Furthermore, there is abundant availability of sand around the globe and safe storage possibilities of silicon make the proposition attractive. Silicon and silica have the potential of producing hydrogen from water and industrially vital compounds, e.g. ammonia and glass, to add. Excess renewable energy is fed into the production of silicon from where it can be converted back to base-load power. With the world reeling from excess carbon dioxide, the team has proposed a shift: from a carbon based to a silicon based economy

Jury NRG Battle Europe Edition 2013:

"The base load concept for offshore wind parks by team ROSEN is based upon the highly innovative idea of using Silicon as an energy carrier. They aim to achieve a carbon dioxide (CO_2) neutral cycle of sand, Silica (SiO_2) and water with the help of power generation by sustainable resources. The oxidation of silica is comparable to carbon, but it doesn't produce carbon dioxide. Besides this, cheap and safe logistics, as well as the possibility to replace carbon based power plants to Silicon based power plants, contribute to a high potential breakthrough solution."

- Roel Croes -