



Local electricity grid on DC voltage (DC=Decent)

Smart Grid Pilot Projects — Results as of September 2015

Innovation programme commissioned by the ministry of Economic Affairs

- **Local electricity grid on DC voltage**
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Goal

- The realisation of a pilot project for DC voltage in a horticultural region to demonstrate the advantages of a DC grid.

Issues

- How can the potential of DC grids be realised in practice?
- How can we save energy and create economic advantages for investors and end users with such a grid.
- How do the legislation and regulations need to be formulated to make this possible?

Duration

- January 2012 through September 2015.

Project partners

- Direct Current BV, DC Foundation, Joulz, Siemens, DNV KEMA, Stallingsbedrijf Glastuinbouw Nederland (SGN), Hellas.

We are consuming more and more electricity because of the increasing use of complex devices. We are also increasingly generating energy using local sources. The existing AC grid is not designed to meet this demand. In a greenhouse development called PrimAviera, located in the municipality of Haarlemmermeer, the world's first DC grid based on sustainable energy is being installed. This pilot project proves that DC voltage could offer a solution for today's energy issues.

Results

A pilot project in the municipality of Haarlemmermeer scored a world first in 2013. Although there is nothing special about the rows of flowering *Bouvardia* growing at the Vreeken nursery, the grow lamps hanging above them are powered by the world's first DC grid. "When we started, no one knew anything about direct current," says initiator Harry Stokman of Direct Current BV. "The system has since become the basis for DC power projects we are establishing all over the world. 1.2 billion people in the developing world have no access to an electricity grid. Why would you install an AC grid developed a hundred years ago there, when you have a cheaper, more sustainable and safer alternative in direct current? We are currently hard at work to make DC voltage the standard in countries such as India and South Africa. This development recalls what happened to the telephony markets in those countries: they didn't bother to install telephone cables but moved directly to



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using smartphones.” In the meantime, the pilot project has had successes at home with street lighting on DC voltage, an opportunity that emerged during the original project in the greenhouses.

“This spin-off is now making us money,” explains Stockman.

“We have installed street lighting on DC voltage in Musselkanaal, Alphen aan den Rijn, the N62 road in Zeeland and will probably include the region covered by the power company Enexis in the near future.” Direct Current BV has become an important knowledge partner in the area of direct current and Stokman wants this knowledge to become widely distributed. “We are developing teaching material for higher education institutions to familiarise students with the new technology, so they can become ambassadors for its further development. DC voltage was a forgotten technique but is now high on the agenda.”

Lessons

In Haarlemmermeer, the cradle of the DC grid, more businesses in the greenhouse cultivation region now want to follow Vreeken’s example and switch to direct current. Another good reason to expand the DC grid is the building of a major solar park. Solar panels generate direct current, and this is currently first converted to AC for transport and then back to DC to be used.

The conversions result in efficiency losses. Thanks to all the positive developments, the pilot project has finally gained the support of the system operator, who until now had not been willing to commit to the project. “I understand why,” says Stokman. “System operators are tasked with managing public resources as efficiently and cheaply as possible. They cannot afford to follow every new trend. But the fact that we couldn’t involve the system operator from day one did form a bottleneck for our pilot project partners. They were required to make major investments without knowing who would own the grid when it was up and running. You need to make agreements like these beforehand, and this was an important lesson. However the cooperation with Alliander now looks more promising. “Their own research has revealed that even a combination of DC and AC voltage is only 10% more expensive than only AC. This is a good solution for parties who are not willing to switch completely to DC straight away; you can use both types of current simultaneously.”

Plans for the future

There are plenty of ambitions and plans for when the pilot project comes to an end. The Vreeken nursery has rented an adjacent

greenhouse to expand their DC project. Vreeken also plans to optimise its CHP plant to the DC grid and they will hook up to the new two-hectare solar park. Direct Current BV is also involved in a project called *de Stroomversnelling* (“The Rapid”) to make social housing in Soesterberg energy neutral. “If you want to install all sorts of equipment such as solar panels and electric hobs then the AC grid will need to be updated, which will be very expensive. By converting the grid to DC voltage you get a lot more capacity for less money. Residents can continue to use their AC equipment using converters made by Siemens. This concerns a total of 2.4 million houses; a good opportunity for the large-scale implementation of DC voltage.” Stokman believes that DC voltage is the key to a future-proof and sustainable energy supply. “There is interest in our project from all over the world, even Germany, which normally leads the Netherlands in sustainable energy developments. Where it concerns DC voltage, the tables have been turned.”

More information

If you want to find out more about the DC voltage grid in the PrimAviera greenhouse development visit www.gelijkstroom.nl. There is also a free digital publication called “Quite right: the future of DC in the Netherlands” published by DC Foundation at www.gelijkspanning.org.

Smart Grid Pilot Projects: energy innovations

The goal of the Smart Grid Innovation Programme (Innovatieprogramma Intelligente Netten – IPIN) is to accelerate the introduction of smart grids in the Netherlands. The Netherlands Enterprise Agency (RVO.nl) carried out the project for the ministry of Economic Affairs. Over the past years, twelve different pilot projects have gained learning experiences with new technologies, partnerships and methods. The pilot phase has now been completed, but most of the projects will be continued. Via RVO.nl they share their experiences, particularly concerning the five key themes involved in smart grids: legislation and regulations, user research and user participation, vision, standardisation and new products and services. The goal is to achieve widespread roll-out via the path of experimentation. More information: www.rvo.nl/intelligentenetten

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This publication was commissioned by the ministry of Economic Affairs.

© Netherlands Enterprise Agency | September 2015

Publication number: RVO-087-1501/FS-DUZA

NL Enterprise Agency is a department of the Dutch ministry of Economic Affairs that implements government policy for agricultural, sustainability, innovation, and international business and cooperation. NL Enterprise Agency is the contact point for businesses, educational institutions and government bodies for information and advice, financing, networking and regulatory matters.

Netherlands Enterprise Agency is part of the ministry of Economic Affairs.