

CARENA is a large-scale integrating project funded by the EC

### Interview with Frans Van Berkel ECN, The Netherlands.

*I studied chemistry at Leiden University with main emphasis on solid state chemistry. I later obtained my PhD at the same University studying ruthenium oxides, where these ruthenium oxides were used as model compound for safe nuclear waste disposal. The focus was on the radioactive element Technetium, which is one of the major radiation sources in nuclear waste. After my PhD a logical next step was to start a career at ECN on Solid Oxide Fuel Cells (SOFC), where my knowledge on Solid State Chemistry could be utilized further. I worked on SOFC from 1990 through 1998 as scientist and project leader of both large scale EU-projects and industrial projects. One of the spin-off activities of the SOFC developments at ECN was the development of oxygen transport membranes, a field in which I was active from 1998 until 2000. At that time I made the decision to broaden my horizons and dive into fuel processing, aiming for the conversion of hydrocarbons to hydrogen, which field is more directly related to catalysis and reactor engineering, but for which my experience in solid state chemistry prepared me well. This topic was booming at the beginning of the millennium especially due to the then contemporary drive towards fuel cell powered cars and micro Combined Heat Power (CHP)-systems. However the interest in this topic started to cool down over a period of three years, after which I found myself back in the SOFC-field working in close collaboration with a German private company on the development of the ceramic heart of the SOFC-systems. This was a very interesting period, in which I gained a lot of experience while working together with an industrial partner towards a marketed product range. From, 2010 I became involved in the Pd-membrane technology development at ECN, as there was an opportunity to run a large EU-project on the use of Pd-membrane technology in the field of Carbon Capture and Storage (CCS). Last year I was asked to take over also the CARENA project as project leader within ECN and as Work Package Manager of WP1. This gave me the chance to further deepen my understanding and knowledge of Pd-membrane technology.*



**Frans Van Berkel**  
ECN, The Netherlands.

[ECN](#) is one of the leading institutes in Europe concerning applied energy research, with about 650 employees. Research activities at ECN are directed towards efficient use of energy and infrastructure, deployment of renewable energy sources, clean conversion of fossil fuels and development of energy analyses and policies. ECN focuses on the needs of government and industry. In addition, it conducts contract research for companies and governmental institutions and to a large extent for the European Union.

#### **ECN's Unit participating in CARENA:**

The **Efficiency and Infrastructure Unit** develops energy efficient technology for process industry. Main developments include heat pumps, structured reactors and distillation equipment, membrane separation and membrane reactors.



Read more on page 2.

### What made you opt for a scientific career? How would you define your job?

I've always had an interest for science in general. From the age of 9 years I was interested in a lot of different science areas, varying from meteorology, constructing my own rainfall meter and wind speed meter etc., to astronomy, trying to construct my own telescope, which completely failed, to electro-technology, demolishing transistor radio and try to use the resulting electronics parts to make all sorts of light pulse meter, which was not of a lot of use but fun to make. When I was 11 years I started to pick up an interest in mineralogy, collecting minerals from different mines all over Europe when I was on holidays with my parents. I tried to understand at that age already chemical formulas for different minerals and their crystal structure classifications. Basically this interest in minerals was the reason to put the emphasis of my chemistry study on solid state chemistry. I think this story makes clear why I ended up in an R&D environment and that I'm feeling rather comfortable in such environment.

My current job is an interesting mixture of technological and scientific aspect mixed with project management, which brings me in contact with a variety of R&D partners, from universities to industry. This combination gives me the opportunity to set R&D targets and to guide the process towards the realization of these targets. I have a strong drive to realize a product at the end of a certain project, whether it is a membrane module, or longer membrane life time etc.

### You were a member of the organizing committee of the joint Cachet II, Comethy and CARENA workshop on Pd Membrane (12-14 November 2012, Rome, Italy). Could you tell us your feeling, feedback.. ?

Having only being active within the Pd-membrane technology field since 2010, I found it interesting to get the chance to be informed on the overall status of the many different aspects of the Pd-membrane technology as presented by the experts in the field. This broad overview really helps to get one further motivated to push the status of this technology. The workshop opened up for me vistas on how to proceed in order to scale-up the technology to a further mature state. I believe that one of the significant outcome is that the cost level of the Pd-membrane technology should be improved, where issues like robustness of performance, membrane module configurations play an important role. In short, this workshop helped solidify the guidelines I have been working towards refining for my day-to-day work in this field.



## CAtalytic membrane RE actors

based on

## New mAterials for C1-C4 valorization

CARENA is a large-scale integrating project funded by the EC

**What is the added-value of an EU project such as CARENA compared with other partnerships on the same topic you may be involved in?**

The main aim of CARENA is to go from C1 to olefins, which is another direction than I was used to work on within the Pd-membrane field, where the aim was to go towards pure hydrogen. This aspect makes CARENA different from the other projects I was both previously and currently am involved. I also consider this to be added value.



**What do you think is the most satisfying part of this project?**

The most satisfying part of this project or any project is to contribute to and observe the progress of the development process towards the end-product. As I explained in the previous question, this is an important driver for me.

**And the most frustrating part?**

This is a tough question. I have no major frustrating experiences in this project. One can always find some minor issues, but I believe these are not worth mentioning in order to improve things for a next possible project.

*Thank you Frans for answering my questions, and all the best for CARENA and the other projects you are involved in.*

### CARENA in brief

Starting date: 1st June 2011

Project duration: 2011 – 2015

Number of partners: 19

Coordinator: Arend de Groot, ECN, the Netherlands

Project Reference: FP7-NMP-2010-LARGE-4

