

Editorial

From Result to Impact

With half a year to go till the end of the project there is a lot of work on-going in CARENA! Final tests prepared and all the work done in the development of the components, membranes, catalyst comes together in the integrated systems tests. Exciting times! Especially because getting the results out requires a real team effort. It is good to see the drive to maximize the project's results.

At the same time, this is also the time to look-up from the work and reflect on the next steps. Time to set things in motion for the follow-up. What have we learned? How can we use the knowledge and know-how developed in the CARENA project to create value? What is needed to get there? In some cases it's relatively straightforward. Especially for results you more or less aimed for. Patents applications are made. Results of more scientific value are used for publications in peer reviewed journals. Or sometimes the value of the result is that it helps to make choices in the further development of the technology: it opens new avenues of research, or sometimes just as valuable, eliminates non-viable approaches.

We tend to focus on the value the results have for ourselves, our consortium partners. More difficult is to recognize the value of our results for the external world. To look through the eyes of other stakeholders at our results and re-discover the value of the results outside of our expectations. What is their use in in other applications, fields or products? What external parties could help us to accelerate innovations based on CARENA results? Therefore we will aim to communicate our results widely, through workshops, leaflets and other communications.

In the final stretch of the CARENA project, this is a great challenge. Recognizing, in the body of work done in the project, the value of the results and the partnerships we could to forge. Making the switch from seeing the results to seeing their potential impact.

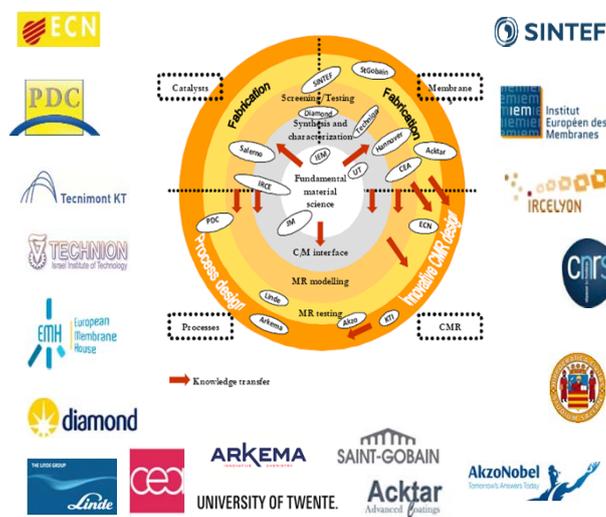
Arend de Groot,
CARENA's Coordinator



Dr. Arend de Groot

The consortium

CARENA gathers **19 partners** with high level of expertise in their fields all over Europe



CARENA



CARENA in progress

1- Review of the Current State

Achievements and Perspectives...

There is probably no better way of evaluating the state of your own project than asking the opinion of an outsider. And this is exactly what we did! On November 19th, 2014 in Amsterdam our strategic advisory board reviewed the scientific progress as well as the CARENA exploitation plan.

The Strategic Advisory Board meeting was attended by 8 persons; 4 on behalf of CARENA, Arend de Groot, ECN (coordinator), Hank Vleeming, PDC (operational and exploitation manager), Gilbert Rios, EMH (dissemination manager), Laurence Bosch, EMH (communication officer) and we were grateful that four distinguished members joined the Strategic Advisory Board (SAB) and shared their expertise with us: Prof. Jean-Claude Charpentier (F), Prof. Adélio Mendes (P), Prof. Miguel Menendez (ES), Ir. Peter Alderliesten (NL).

The members of the Strategic Advisory Board express their positive assessment of the CARENA project progress and results and find the results of clear interest. They emphasize that the broad approach that is followed in CARENA offers unique opportunities. The challenge for the management of the CARENA project is to

make the impact of the integrated approach visible.

The SAB stresses that a good presentation of the impact of the project as a whole will both create a good image of the project for the outside world as for the EC. This last point will ensure that the wrap-up of the project with the EC will be facilitated.

On the dissemination and exploitation aspects, the idea of using technology leaflets to show which technologies are offered or requested appeals strongly to the SAB. It has been suggested to call them "innovation leaflets" to emphasize the innovation aspect.

The exploitation and dissemination will also be highlighted in the final and dissemination meeting which will be organized from 28th to 30th of April 2015 in Montpellier.

What is CARENA ?

The 1st of June 2011 marked the start of the CARENA project: **Catalytic Reactors based on New Materials for C1-C4 valorization**. It is an EU-funded collaborative project to create technologies enabling efficient conversion of light alkanes and CO₂ into higher value chemicals. To reduce the dependency of the European community on imported oil, the CARENA project will promote the implementation of catalytic membrane reactors in the European chemical industry.

Collaborative Project: Large-scale integrating project

FP7-NMP-2010-LARGE-4

48 months - Start day : 1st June 2011

www.carenafp7.eu

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2 – Joint Workshop in the Netherlands

Joint Workshop on Scale –up of Pd Membrane Technology From Fundamental Understanding to Pilot Demonstration was hosted at ECN on November 20&21, 2014 in Petten, the Netherlands.



This joint workshop is a follow-up and brought together the 4 EU-funded projects **CARENA, CoMETHy, DEMCAMER and ReforCELL** for the second time! Previous workshop was held in Rome, Italy in 2012.

This was a 2-days (lectures, posters sessions and interactive discussions) event including a visit to ECN facilities packed for an intense Dutch experience.

It proved a unique knowledge-sharing experience for representatives of academia, research institutions and industrial stakeholders. 74 participants from 17 countries get together to further explored the latest topics in fundamental aspects of Pd membrane technology, manufacturing and scale-up challenges and towards industrial applications and alternatives others.

The whole event was hosted by ECN on the behalf of the 4 EU-funded projects: Congratulations for the good job!

Feedback from the workshop attendees was extremely positive. Frans van Berkel (ECN Senior Scientist and Chair of the Organizing Committee) admitted “There was such genuine contribution and common drive to find the right way to make sure that palladium membrane scale up happens – and soon – as we all believe this to have breakthrough potential for so many applications including hydrogen power, refining, petrochemicals, hydrogen vehicles to name a few!”



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3 – Interviews with CARENA partners

Learn more about our different partners and discover the strengths and diversity that make CARENA project a so fruitful experience. **Meet Elizabeth from Diamond and Hank from PDC!**



Elizabeth Shotton
Head of Industrial Liaison

Hank Vleeming
Chief Technology Officer



The CARENA project has been designed with a strong emphasis on multidisciplinary approach. What progress can be expected if chemists work in closer relation with other disciplines?

The synchrotron environment is a multidisciplinary one and we see daily advantages by working with colleagues from other backgrounds. Here chemists, physicists, metallurgists, biologists, earth scientists, archaeologists to name but a few work together regularly. **By bringing a range of experiences to bear on a scientific problem, creative solutions can often be found and new advances made.**

Last but not least, let's zoom out on broader themes. Sustainable development and environment issues are key concerns nowadays. How does membrane chemistry fit in the pattern? Would you say chemistry is going through major changes?

Changes in legislation along with a drive to reduce costs and energy use have made sustainable chemistry a key priority for many industrial areas. Innovative approaches, such as the use of membrane catalysts, are needed to tackle these problems. **In our experience, multidisciplinary teams with a range of different expertise and interests are able to make a positive contribution to these challenging projects.**

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?

For us, **the benefit is that the consortium brings together partners with various expertise needed** to develop catalytic membrane reactors. This allows us to develop a novel methodology for conceptual design of catalytic membrane reactors as an extension of our tools.

The idea behind combining membranes with reactors is that it intensifies the chemistry by improving the reaction performance, such as a shift in equilibrium. Often it becomes feasible to work at lower temperatures, which leads to energy savings. Also, it may enable to use different feedstock. This makes the process more sustainable and environmentally friendly. In CARENA one of the objectives is shifting to cheaper and more abundantly available raw materials. At PDC we clearly notice a change in our process design work over the past ten years towards bio-based chemistry.

[Read the full interviews online](#)

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Meet Nieck from Twente University and Thijs from SINTEF!



Nieck Benes
Adjunct Professor

UNIVERSITY OF TWENTE.



Thijs Peters
Senior researcher

 **SINTEF**

The CARENA project has been designed with a strong emphasis on multidisciplinary approach. What progress can be expected if chemists work in closer relation with other disciplines?

The cliché is that progress can be found at the frontiers between disciplines. Many clichés hold some truth.

My educational background is Process Technology, or more precisely Reactor Technology. For my PhD I have made a switch to Inorganic Materials Science with a focus on Irreversible Thermodynamics and Multicomponent Mass Transport. Then to Process Design, with focus on high pressure systems and sonochemistry. Now I have turned back to Materials Science again, focusing on Hybrid Materials and *in-situ* characterization of thin membrane films.

“Such multi-disciplinary discussions facilitate the birth of solutions”

The broad scope of this background helps me to find collaborators from different fields and to discuss with them their view on the problems our group is working on. Such multi-disciplinary discussions facilitate the birth of solutions that one would never come up with when one is confined to a single discipline, or to assess the value of your own work in a realistic context.

You were a member of the organizing committee of the joint Reforcell, DEMCAMER, Comethy and CARENA workshop on Pd Membrane (20-21 November 2014, Petten, The Netherlands). Could you tell us your feeling, feedback... ?

The workshop will take place in three weeks' time, and we are now working hard to finalize the program, arrange all practicalities around lunches and transport. The interactive discussion also needs to be set up. To my belief, we have managed to put together a very good scientific program with contributions from all over the world showing the large efforts and interest that currently is being laid in the Pd membrane technology. With the current status of registrations, around 70 participants from industry, research institutes and universities, I am sure of that the workshop is going to be large unique knowledge-sharing success.

“ This is also why CARENA, with its strong emphasis on multidisciplinary, is a very interesting and awarding project to contribute to. The contribution of people with different background, as well as the interaction of people employed at universities, research institutes and the industrial partners of CARENA that is very valuable. ”

[Read the full interviews online](#)

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4 – Interviews with ESR/ER

Learn more about our ESR and ER and discover the strengths and diversity that make CARENA project a so fruitful experience.

Meet Michiel from Twente University and Martin from IEM!



ESR
Michiel Raaijmaker
UNIVERSITY OF TWENTE.

What is the best thing about taking a PhD? How challenging is it?

Doing a PhD allows you to create completely new concepts. This involves devising creative new ideas and smart collaborations with colleagues in different institutions. By gaining new insights, you are constantly required to adjust the direction of your research. **Maintaining control over the evolution of your project is maybe the most challenging, but this also makes it rewarding.**

What is appealing to you being a researcher?

You are constantly developing yourself at many different levels. As a researcher, Lifelong Learning is a central aspect. If you do it right, you are part of an assembly of experts that strengthen each other's competences. You learn how to steer a project, collaborate – even if the stakes of other parties are not the same – and how to build expert knowledge. Definitely, you strengthen your ability to critically analyze situations, anticipate outcomes and deal with unexpected situations.



ER
Martin Drobek

What is appealing to you being a researcher? How would you define your job?

Being a researcher is a huge passion for me. Already at high school I was dreaming about this job I found very challenging and exciting. The work of researcher is never a routine. In fact, it is a never-ending story of searching new ideas, innovations and projects which brings you to new findings and challenges pushing you further in your scientific research. It depends on you if your ideas become reality, and if successful, the personal satisfaction is priceless.

“my involvement in CARENA project represents a very important milestone in my scientific carrier”

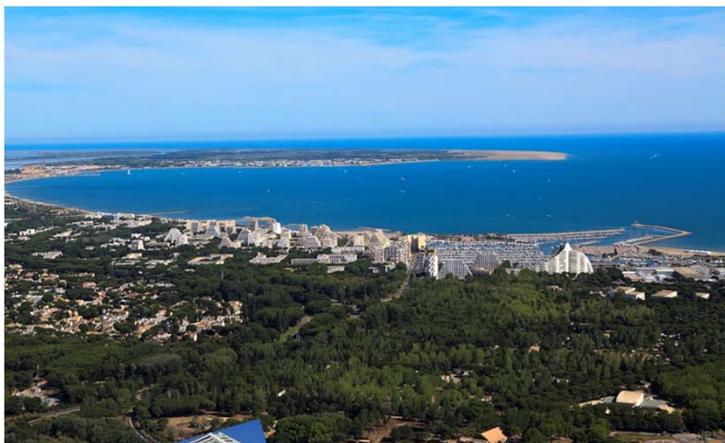
What is the added-value of an EU project such as CARENA compared with other partnerships on the same topic you may be involved in?

The principal added value of a big project such as CARENA bears on an outstanding possibility to create a rich network of researchers from different countries combining their different expertise but also diverse cultural backgrounds which open the way to new and attractive solutions during collaboration on joint projects. In addition, involving numerous PhD students and postdoctoral researchers is highly beneficial not only for the project itself but also for formation of new generation of well-trained and open-minded scientists.

[Read the full interviews online](#)

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5 – Upcoming Events



Final and Exploitation CARENA Meeting

28-30 April 2015. La Grande Motte near Montpellier, FRANCE

The final and exploitation meeting will be kindly organized by EMH on the behalf of CARENA. This event will allow the possibility to draw a conclusion and make a state of art of the whole CARENA project over the 4 years long.

This will lead us to highlight the achievement made in every WP and lead to emphasize the axes who need more work for the future.

Exploitation and dissemination will be also discuss to allow a better visibility of the overall project.

The venue will be La Grande Motte on seaside resort. 20 Km away from Montpellier. 10 km to Montpellier's airport.

Dates: 28-30th April 2015



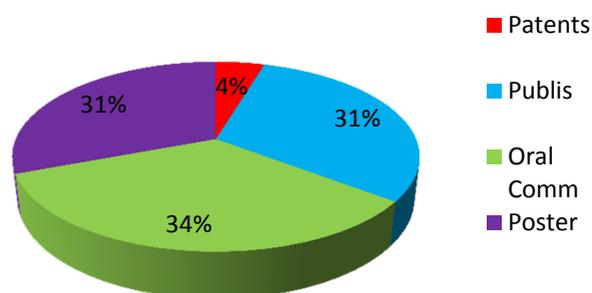


6 – Publications // June 2011- December 2014

The PhDs and senior researchers are active and participate to several national and international conferences and meetings in order to communicate the CARENA's results. They have reported several scientific publications in peer-reviewed journals .

Please find more details *via* this link :
<http://www.carenafp7.eu/index.php/Publications/Publications.html>

Overview of the communication supports



Miscellaneous

- 12th International Conference on Catalysis in Membrane Reactors, ICCMR 12, Szczecin (Poland), 22-25th June 2015. <http://www.iccmr12.zut.edu.pl/>
3rd February 2015: Deadline for Abstract Submission
1st April 2015: Deadline for Early Bird Registration

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