

Transition scenarios & system integration

Working together to bring about the transition to sustainable chemistry

The Climate Agenda and the Climate Agreement aim for an energy transition and a fully circular economy by 2050. The chemical industry has an important part to play in this. Brightsite's program line 5, 'Transition scenarios and system integration', looks at how to realize this transition for an entire site like Chemelot in a safe, sustainable and economically sound way. It is crucial that we work on solutions collectively but also that there is room for individual projects. "Brightsite is the perfect partner to help make the most of synergies on a site and take technology in development one step further."

Proud partners

Sitech Services
TNO
Maastricht University
Brightlands Chemelot Campus



The value of synergy in transition

The chemical industry can play a huge part in reducing CO₂ emissions in the Netherlands and in making society as a whole more sustainable. "It makes sense that companies mainly focus on their own situation when looking at ways to become more sustainable. They struggle to appreciate the full scale of the situation for the site as a whole. At Brightsite, our aim is to link up the different plans and parties to promote synergies and a site-wide strategy," says René Slaghek, Technology and Program Manager at Brightsite.

Strongly connected innovation chain

The Dutch climate targets were established by the Climate Agreement of 2019. Part of this Climate Agreement involves promoting a 'frontrunner approach' via six Dutch industry clusters. Chemelot, as one of those industry clusters, has been asked to draw up a regional vision for sustainable industry in 2030. In February 2018 – so even before the Climate Agreement – Chemelot together with 12 other companies signed the 'Limburg Energy Agreement' (LEA) letter of intent, which pursues similar aims to those of the Climate Agreement. There are now around 28 companies participating in the LEA, and energy transition and sustainability plans are elaborated in the biennial Cluster Energy Strategy (CES) and the Chemelot Cluster.

Regional Plan 2030. "There have always been powerful synergies at this site, making it ideally placed to realize this transition. No other site in the Netherlands or Europe has such a strongly connected innovation chain," says Slaghek.

Brightsite's job: connecting parties, aligning solutions

When DSM sold several of its plants, the focus at the Chemelot site shifted onto optimizing the operation of individual plants. As a result, collaborative innovation was at risk of vanishing altogether. "Alongside the Climate Agenda, this led to the realization that we need collaborative, sustainable innovation in order to make Chemelot future-proof. The technologies needed for this already exist on a small scale, but have not yet been applied anywhere at an industrially relevant volume. The know-how to make that move in scaling up doesn't just belong to one party. This was the seed from which Brightsite emerged in 2019. Brightsite has a comprehensive overview and helps companies make the right choices for new developments. In doing so, it is important to deploy processes that meet the needs of the site as a whole. This is known as system integration. Brightsite sees it as its task to mobilize the various parties and bring them closer together. The site needs to work together to develop a strategy which it can then implement. We need to bear in mind that changes in processes and new technologies will influence each other. That's exactly what program line 5 is all about," explains Slaghek.

Making the best choices together

Although Chemelot is currently an integrated site, based on the use of naphtha and natural gas, the future is all about electrification and the greening of raw materials. SABIC and OCI Nitrogen are two of the largest companies at Chemelot, using naphtha and natural gas, respectively. "Our production process is energy-intensive, and is currently powered by naphtha, among other things. This releases a substantial amount of CO₂. We therefore feel a shared responsibility to work hard to reduce this," says Leon Jacobs, Director of Sustainability Europe at SABIC. "Many companies now recognize the importance of having a climate roadmap. The tricky thing is that some solutions are within reach while others are far away and require far-reaching innovations. How do you make the right choice as a company and as a site? For everyone involved, this transition comes with uncertainty. Brightsite is ideally placed to help companies on the site deal with this uncertainty. It's not a 'one size fits all' approach. Brightsite helps us and other companies decide what will fit our portfolio, and together we work out different options," Jacobs says.

Jan Jaap Nusselder, Public Affairs manager at OCI Nitrogen, also sees the benefit of alignment

when it comes to making choices. "When we look beyond our individual choices and see them as part of the bigger picture, we can strengthen each other. Working together eliminates some of this uncertainty and, besides that, this is a case where the whole really is greater than the sum of its parts. That's not to say it's always easy. It is no simple matter to connect companies, as they are in competition with each other. Brightsite is the oil in the machine, functioning as a connecting factor to bring this about. Under the leadership of René Slaghek, we use the CES to discuss the best route and make concrete plans regarding the strategy for the near future (2020-2030) and for further ahead (2030-2050)," explains Nusselder. Jacobs agrees: "A party like Brightsite makes it easier for us to talk to each other."

Leon Jacobs, Director of Sustainability Europe at SABIC:

"It's not a 'one size fits all' approach. Brightsite helps us decide what will fit our portfolio, and together we work out different options."

Plasma as a key technology

In addition to its role in shaping the strategy for the entire site, Brightsite initiates projects to further develop promising technologies. For example, OCI Nitrogen and SABIC have been brought together because they both have an interest in developing plasma technology – one of the key technologies in the transition to electrification. Using plasma technology, we can utilize methane in the most effective way possible by converting it into hydrogen and high-quality hydrocarbons, without releasing any CO₂. Hydrogen is an important feedstock for fertilizer producer OCI Nitrogen. "If we use this technology to make hydrogen more sustainable at the front end of our process, we will make a huge impact. We won't make totally new products or completely revolutionize the process, but by doing a few things differently we can make products that consumers and society need. And that's unique," says Nusselder.

Plasma technology also appeals to SABIC. "At SABIC, we are working hard on technologies to electrify our crackers, but that means we will be left with methane. Plasma technology provides a way of dealing with that 'stranded' methane.

The added bonus of this process is that we will be making the raw material for OCI Nitrogen. This technology is still a bit further away, given its low Technology Readiness Level (TRL). But it's good that Brightsite is involving us in bringing a technology to maturity that could be of great importance to making Chemelot more sustainable," Jacobs emphasizes.

Keeping our promises

There are lots of interesting developments on the horizon, say Jacobs, Nusselder and Slaghek. "With still a lot of decisions to be made and technologies to be developed and implemented. That, plus connecting (new) businesses to the site, is an exciting challenge. It will be important for us to make the right products, products that have value. It's more than just greening," says Nusselder. "We will have to be able to produce in a sustainable and circular way," adds Jacobs. "Laws and regulations will also play a role in this. The synergies at the site have ensured that we have made a good start to achieving this transition, and we need to take advantage of this. We are happy that Brightsite is helping us, driving and putting a lot of energy into this task."



Jan Jaap Nusselder, Manager Public Affairs OCI Nitrogen:

"Brightsite is the oil in the machine that can connect businesses."

Program line 5 – Transition scenarios & system integration

The transition to a climate-neutral Chemelot by 2050 is highly dependent on a variety of rapidly changing (external) factors. “In program line 5, we are looking at how to tie together the different opportunities and processes for greening. It's one thing choosing and developing the right technologies to achieve the transition to a green Chemelot, but the technologies also need to be optimally integrated into the Chemelot system. The key is to choose the most cost-effective solution for Chemelot as a whole. That is why we look at the dilemmas, obstacles and risks, but also at the social synergies and new opportunities across our site and beyond. This applies to a variety of other topics and processes, from clean hydrogen production to circular water. All processes are viewed together as a whole. We try to provide this insight to the different stakeholders on the site and talk about it both internally and externally, for example with public authorities.

Thanks to the variety of processes, there are a lot of synergies to be achieved and many innovative ways to process residual products. It's a challenge and an opportunity to preserve the synergies we have here at Chemelot, leverage them, and breathe new life into them with new technologies. If we are successful in this, then Chemelot will remain a competitive site,” says Slaghek.

René Slaghek, Program Manager Brightsite:

“The synergies we have here at Chemelot must be preserved, exploited and revitalized with new technologies.”

Does your company
recognize itself in the
working method of
Brightsite?

The future outlook is that Chemelot has met the national goals for greenhouse gas reduction by implementing the most cost-effective measures while ensuring production. In 2050 Chemelot is entirely carbon-neutral, based on an optimal transition pathway. Do you want to contribute to this program, or do you want to make use of our services?

Please contact us.

René Slaghek
Program Manager Transition
scenarios and system integration
rene.slaghek@sitech.nl
+31 (0)6 200 159 35

