

## Hope or despair for green chemical industry?

During the break-out session 'mission-driven innovation: the case of green chemistry' of the Pathways to Sustainability Conference, scientists from various disciplines outlined their perspective on the sustainability of the chemical industry. Between their hopes and fears about ever having a green chemical industry - preferably before 2050 - there is a role for academics.

The challenge of making the chemical industry more sustainable is immense, says Martijn Broekhof, who looks at the challenge from an industry perspective. The chemical industry accounts for about 10 per cent of national CO<sub>2</sub> emissions, and is now almost entirely based on fossil fuels. Energy must be drawn entirely from sustainable sources, and the raw materials must also be produced sustainably, and then collected and reused 100 per cent efficiently. The production chain will have to be overhauled. As yet, there are no ready-made solutions to realise this – “we cannot recycle our way out of trouble”.

### Hope

However, there is hope for a green chemical industry, said Pieter Bruijninx, Professor of Chemistry at Utrecht University. There is a huge opportunity for the chemistry field to create new, more sustainable molecules. It does require an entirely new way of thinking. In recent decades, we as chemists have mainly been busy designing products that are as functional and cheap as possible, without worrying too much about the consequences for the 'world'. Now we have to teach our students to do chemistry with sustainability in the back of the mind, or rather in the 'front of the mind'. Then, with chemistry, anything is possible.

### Despair

Marko Hekkert, Professor of Geosciences at Utrecht University, fears that the much-needed sustainability of the chemical industry by 2050 is a vain hope. We are now in the so-called formative phase, a phase of experimentation and 'puzzling'. For example, the solutions do not yet exist, companies are not eager to make the change and plans are still being developed. After a formative phase, which in the case of simpler innovations such as the e-bike or the mobile telephone, can easily take 22 years, the innovations still have to 'grow' (increase their market share). It will take at least another 20 years for the entire industry to adopt the new way of doing things. Realistically, then, even in the best-case scenario we will not achieve the Paris climate targets.

### The role of universities

Precisely between this hope and fear lies a role for the university, argue sustainability researchers Sanne Akerboom and Peter Bijl. On the one hand, we have to ensure that the transition to a green chemical industry takes place quickly to prevent destructive consequences for the climate. On the other hand, the social and economic consequences will have to remain limited. It is up to the university to guide the chemical industry in this respect; to provide them with facts and not create any additional friction. Initiatives such as the Sustainable Industry Lab, where academics, experts and organisations meet, bridge the gap between industry and society.

The fact that such initiatives are largely subsidised by the government and not by industry shows that we still have a long way to go. But also, Rome was not built in a day.