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SUMMER 2015

THE EFFECTS OF SHALE GAS ON PEOPLE AND THE ENVIRONMENT



The European Commission has sanctioned the start, on 1 June, of one of the first major European studies into the effects of shale gas production on people and the environment. TNO is coordinating the work of a consortium of eighteen research institutes from ten different countries that will be investigating questions like: what effects do surface activities and installations have on the landscape, what is the effect on the groundwater, what are the effects of supplying large quantities of liquid? The risks, and how to minimise them, will be investigated for all aspects of the production process.

The project, called M4ShaleGas and which involves 18 partners from ten different countries, will also gather best practices from the United States and carry out experiments to check the behaviour of the European shale layers. Models will also be developed to predict the impact of fracking methods and what

measures can be taken to reduce environmental damage. Cooperation is being sought with the oil and gas industry for data from existing shale gas activities around the world. An industry panel will ensure that the experiences of companies are shared with the consortium.

The consortium will expressly avoid becoming entangled in the political and social debate on the usefulness and need of shale gas production: the consortium partners are unbiased research institutions that exclusively provide the requisite scientific knowledge that may aid the debate.

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RESEARCHING SUSTAINABLE PLASTICS

TNO and the Dutch province of Limburg recently launched the Brightlands Materials Center, a new research facility for plastics. The new materials centre at the Brightlands Chemelot Campus in Geleen has access to an international network of affiliated universities and companies.

Scientists and specialists from the industry will be working in joint research programmes at the Brightlands Materials Center on sustainable technological innovations in plastics for a range of purposes like packaging, lightweight mobility, polymer-based electronics, 3D printing and recycling. By combining the

technologies of the affiliated partners, the centre can accelerate development time.

The Brightlands Materials Center is a public-private partnership whereby the strategic roadmaps of the top sectors High Tech Systems and Materials and Chemical Engineering are linked in the area of polymer materials. It signifies an important step in the development of the most innovative knowledge centre in polymer materials in the southeast Netherlands. By May this year 20 companies had already expressed their intention to work with the centre.

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TACKLING JIHADISM DEMANDS RADICAL INNOVATION

There is currently a considerable focus on tackling jihadism and combating radicalisation, with repressive measures dominating. However, early intervention is a more effective countermeasure. TNO has developed a method to make extreme radicalisation processes transparent and has built up relevant expertise in various projects to identify radicalisation on the internet (and the Darkweb), generating leads for interventions via online behavioural influence.

The advanced analysis and visualisation of large amounts of data and social networks enable a more efficient and effective deployment of professionals among the respective services. As one of the fourteen partners in the IMPACT Europe consortium, TNO is involved in the development

of a toolkit that supports the systematic evaluation of various interventions; not just retrospectively but also in advance by embedding the best evaluation methods).

'Serious games' offer another perspective. TNO has developed a variety of game concepts for training both governors (like the 'Majors game') and citizens (like the self-reliance game) that could also be used to counter jihadism.

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'HIGHLIGHTING' THE VITALITY OF MICRO-ORGANISMS

Horticulture is increasingly opting to combat plagues and diseases with a biological solution; it's better for both the horticultural farmers and the environment. It involves using natural organisms to get rid of harmful insects, fungi and viruses. The innovative Dutch agrotechnology company Koppert Biological Systems uses 'good' fungi and bacteria in different products to combat plagues and diseases, so it is important that these fungi and bacteria are kept as vital as possible.

TNO has developed a patented method to screen micro-organisms in real time using a fluorescent marker that only lights up when the fungi or

bacteria are vital: Real Time Viability (RTV). On the basis of this TNO patent, Koppert and TNO jointly developed a protocol to quantify the vitality of the fungi and bacteria that are used. Koppert will be able to use this to more quickly and efficiently select the optimum organisms.

After the successful completion of the project Koppert has decided to take out a licence to introduce the RTV technology company-wide. This technology will first be used as standard in the Triumf product that actively combats a number of soil diseases like *Fusarium* and *Pythium*.

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Koppert also supplies bees to pollinate tomato plants.

HEPHAISTOS CALCULATES FIRE RISKS

Over the course of time fireproof building has become subjected to a whole complexity of regulations concerning construction. The installation and organisation, TNO has now taken the initiative to develop a new method that considers fire safety and measures from a risk perspective.

The result will be Hephaios, a model that will help determine compliance with the regulations of the Dutch Building Decree. The

model can be used in a 3D building model to visualise and compute the measures as well as calculate the residual risk in the respective building along with the investments needed and operational costs of these measures. The building's owner will be able to raise the level of fire safety requirements of his building above the minimum statutory requirements (for example, for less self-sufficient residents) and account can be

PRINTED PASTA

World premier at EXPO2015 in Milan: the 'pasta printer'. Italian pasta producer Barilla and TNO present a prototype of this 3D printer, developed by TNO, at the world fair that is being held from 1 May to 31 October. It allows 3D pasta shapes to be printed that are not possible with normal methods. The printer is currently able to print four elements every two minutes and they taste just like normal fresh pasta. The printer is not yet commercially available.



3D printing is an innovative manufacturing process that creates an object layer by layer directly from a 3D computer design using a range of techniques, including droplet deposition or powder sintering by means of a laser. These methods can be used to produce objects from single or combinations of multiple materials. 3D foodprinting combines TNO's engineering expertise of the printing process with food science knowledge.

3D foodprinting is an entirely new way of producing food products and is highly promising for a variety of reasons. It opens the way to fully personalisable food (making products that precisely

fit the needs and preferences of individuals, like athletes or older people); there is huge design freedom (not only in terms of shape but also in terms of composition, structure, texture and taste); a personalised meal can be made at just the right moment (fresh and healthy, and ready when the consumer wants it); and 3D foodprinting can help turn alternative ingredients, like proteins from algae and beet leaves or ingredients that are unused due to their appearance, into tasty products with recognisable structures that are both healthy as well as environmentally friendly.

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taken of the (effect of) equivalent solutions.

In order to develop Hephaios, TNO has formed a consortium with Effects (specialist in fire research), Octaal adviesgroep (advise and project management in the field of integral safety) and SBRCURnet (independent knowledge partner for building and construction), with a sounding board comprising ministries, safety regions, insurance companies, healthcare

institutions, the Institute for Physical Safety and others. This all gives Hephaios a solid level of support for broad acceptance.

The Dutch government is also helping to fund the development of Hephaios and there is already international interest in the calculation model.

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