Food Futures
Towards Sustainable Production and Consumption

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Chatham House
9-10 December
London
Nanotechnology Industries Association – NIA

... the sector-independent, responsible voice for the industrial nanotechnologies supply chains...

... the only global industry-focused trade association for the nanotechnology sector...

... proactively supports the on-going innovation and commercialisation of the next generation of technologies and promotes their safe and reliable advancement...

... cooperates with regulators and stakeholders on national, European and international levels so as to secure a publically and regulatory supportive environment for the continuing advancement and establishment of nanotechnologies...
Issues and Challenges for Food Production

• Food consumption patterns
  – Convenience food, more meat, more vegetarian
• Consumer drives towards ‘natural’ and ‘locally produced’
• Energy input for food production
• Environmental aspects of food production
• Food security
• Food safety- and risk-assessment approaches
• Obesity, malnutrition
• Non-communicable diseases

Nanotechnologies as a Key Enabling Technology (KET) can be applied in many ways
The adoption of nanotechnologies industries happens not by technology-push

... but by market-pulled or policy-enforced demand for sustainability (external/internal):

- Consumption of Energy (i.e. manufacture, processing, fleet fuel efficiency)
- Emission:
  - air (e.g. CO₂-emission)
  - water (e.g. detergent use)
  - solid (e.g. waste)
- Water Consumption
- Toxicity Potential
  - Nanomaterials as replacements of proven toxic substances
- Consumption of Raw Material
- Safety (i.e. nano-enabled monitoring- and detection-equipment)
General Applications of Nanotechnologies in the Food and Feed Sector

- Increased yields through smart fertilisers that react to environment conditions such as temperature or humidity
- Reduced overall fertiliser consumption, due to sensor-triggered timely and targeted use, rendering agricultural production more environmentally friendly
- Improved food quality monitoring with nanosensors, making it possible to effectively detect minimal decay or contaminations at an early stage
- Higher bioavailability of food ingredients such as essential vitamins and minerals
- Longer shelf life, increased pathogen control and reduced spoilage

[BIAC Vision paper, Responsible development of nanotechnology. Turning visions into reality, February 2013]
General Applications of Nanotechnologies in the Food and Feed Sector (…)

- **Improved water management:**
  - Removal and/or remediation of contaminants in drinking and waste water, such as trace heavy metals and organics
  - Better membranes to enhance flux and selectivity in membrane-based separations
  - Developing nano-surfaces to increase the surface area for reactions, and thus reduce filter friction

- **(Soil) Pollution Remediation:**
  - Nano-scale iron particles to oxidise organic contaminants
  - Heavy metal separation (mercury, lead, arsenic) using nanoporous materials
  - Dendrimer polymers to separate and trap pollutants

[BIAC Vision paper, Responsible development of nanotechnology. Turning visions into reality, February 2013]
Nanotechnologies in the Food & Feed Sector:

- Incremental innovation for food production technologies
  - Disruptive innovations are not as likely, due to regulations requiring product authorisation and consumer conservatism

- Continued focus on packaging developments
  - Easier consumer acceptance
  - Direct benefits (improved quality, cost reduction) for packaging manufacturer, food producer, final consumer

- Continued product development in relation to ‘health foods’ (whether claims are supported or not)
  - e.g. supplements, nutraceuticals
  - Increased specialisation

- Improved food safety and food security
  - Less waste, better monitoring, improved transportability
Nanotechnologies in the Food & Feed Sector:

- Continued scientific and technological advancement of (nano)technologies based on (nano-enabled) feedback
  - Innovation and novel products on the market throughout the whole production chain (farm – fork – farm)

- Improved energy efficiency and environmental sustainability of both food production and transport:
  - Cleaner transport and production of products, fuelled by …
  - Energy from renewable resources

- Regulatory discussions of grey zones
  - Claims, nutraceuticals, food for particular nutritional purposes

- Enhanced consumer communication
  - Enhanced analysis triggers demand for enhanced vigilance
Better Safety-Screening Instrumentation through Nanotechnology

- Nano-enabled sensors: nanotechnology enables more sensitive instruments with lower detection limits
  - **Impacts**
  - ... for industry and safety-assessors: improved instrumentation availability for monitoring purposes both during production and for market monitoring
  - ... for policy-makers: increased detection of incidental contaminants can result in increased media attention and increased pressure to act on residue levels that are of no risk

... to which nanotechnology – in turn - offers a

In the debate on ‘food safety’, nanotechnology provides the solution (more often than the problem).
EFSA creating Inventory of nano-based Food and Feed Activities

The European Food Safety Authority (EFSA) is working on an inventory of food additives/food contact materials/food additives applications in the area of nanotechnologies. This was revealed through an internal mandate, M-2012-0216. A sum of EUR 100,000 has been allocated to the organisation’s Feed Unit for the task so that they may deliver one external scientific report by September 2013.

An inventory was recently considered a priority by EFSA, and as such more up-to-date information on the state of the art would be required. Therefore the Feed Unit has been asked to prepare a background document alongside the inventory of nanotechnology applications in the food and feed areas. Furthermore, the current European Commission (EC) recommendation for a definition on nanomaterial must be used for the development of the document.

The internal mandate was received in July 2012 and was approved on the 28 September of the same year.
Thank you!

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European Commission definition excludes a large range of products

‘Commission definition of “nanomaterial” is limited to materials consisting of particles (excluding non-particular materials such as proteins or micelles as present for example in mayonnaise), and excludes nanostructured materials (i.e. solid products, parts or components) with an internal or surface structure in the range between 1-100 nm, such as computer chips).’

[Commission Recommendation of 18 October 2011 on the definition of nanomaterial (2011/696/EU)
European Commission Question and Answer no 3]
'the benefits of nanomaterials range from saving lives, breakthroughs enabling new applications or reducing the environmental impacts to improving the function of everyday commodity products’

'nanomaterials are similar to normal chemicals/substances in that some may be toxic and some may not'
• The current regulatory EU landscape is applicable to nanomaterials.
• There is no need for specific regulations for nanotechnologies or nanomaterials
• Avoid overly cautious policy and regulations
• Find balance for EU competitiveness
Commercialisation patterns and regulations

Nanotechnologies – Opportunities for growth

- An enabling technology with applications in agriculture and the food sector
- Large interest from industry and active research field
- Risk assessment follow standard procedures with nanomaterial specific modifications – Guidance available