

# ADVANCED MATERIALS HORIZON PANEL

BUILDING A FUTURE, ONE LAYER AT A TIME

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STRATEGIC  
TECHNOLOGY  
FORESIGHT  
PROGRAMME

# HORIZON

# BUILDING A FUTURE, ONE LAYER AT A TIME

The contribution of materials and engineering to the shaping of society has remained consistent over time. Whereas in the past materials were relatively simple, today technological developments, relating to the composition and structure of materials at an atomic level, endow them with exactly the desired properties to allow them to be manipulated as required. These materials, termed Advanced Materials, are as likely to define the future as simple materials have defined the past. All sectors globally are now dominated by a multitude of advanced materials. Advanced Materials R&D has become multidisciplinary, incorporating the convergence of key enabling technologies such as chemistry, physics and biology, which coupled with advanced engineering capability improves the competitiveness of technology based enterprises and pave the way for prosperity and employment in modern industrial societies.

The current innovations in advanced materials and engineering are often the driving force for industrial product developments. Industries such as aerospace, automotive, chemicals, medical devices and ICT benefit significantly from advancements in these materials. Moreover, the industries that are significant to Northern Ireland - aerospace, automotive, medical devices, food, energy etc. look to

Advanced Materials and Engineering to enhance their capability.

NI has Advanced Materials capability which is seen to underpin all sectors ranging from Agrifood to Aerospace. However, the quantity of R&D in NI is not sufficient for the range and size of sectors within the region. The analysis of the industrial and academic strengths shows that a rich focus area for NI is the convergence area between traditional material sectors and a focus on the interdisciplinary and multidiscipline areas of advanced materials. Specifically these areas are:

- Biomaterials;
- Nanostructured Materials;
- Multifunctional Materials (including catalysis);
- Composites; and
- Computational Science.

In these areas NI demonstrates established competency to be globally significant and to create a niche leadership focus within the UK, Europe and the world. Additionally, there is an emerging global sector, which utilises the multidisciplinary skills of these focus areas to produce new break-through solutions to existing common themes in all sectors. This emerging sector presents a grand challenge to

Advanced Materials and Engineering in NI - it is called Cleantech.

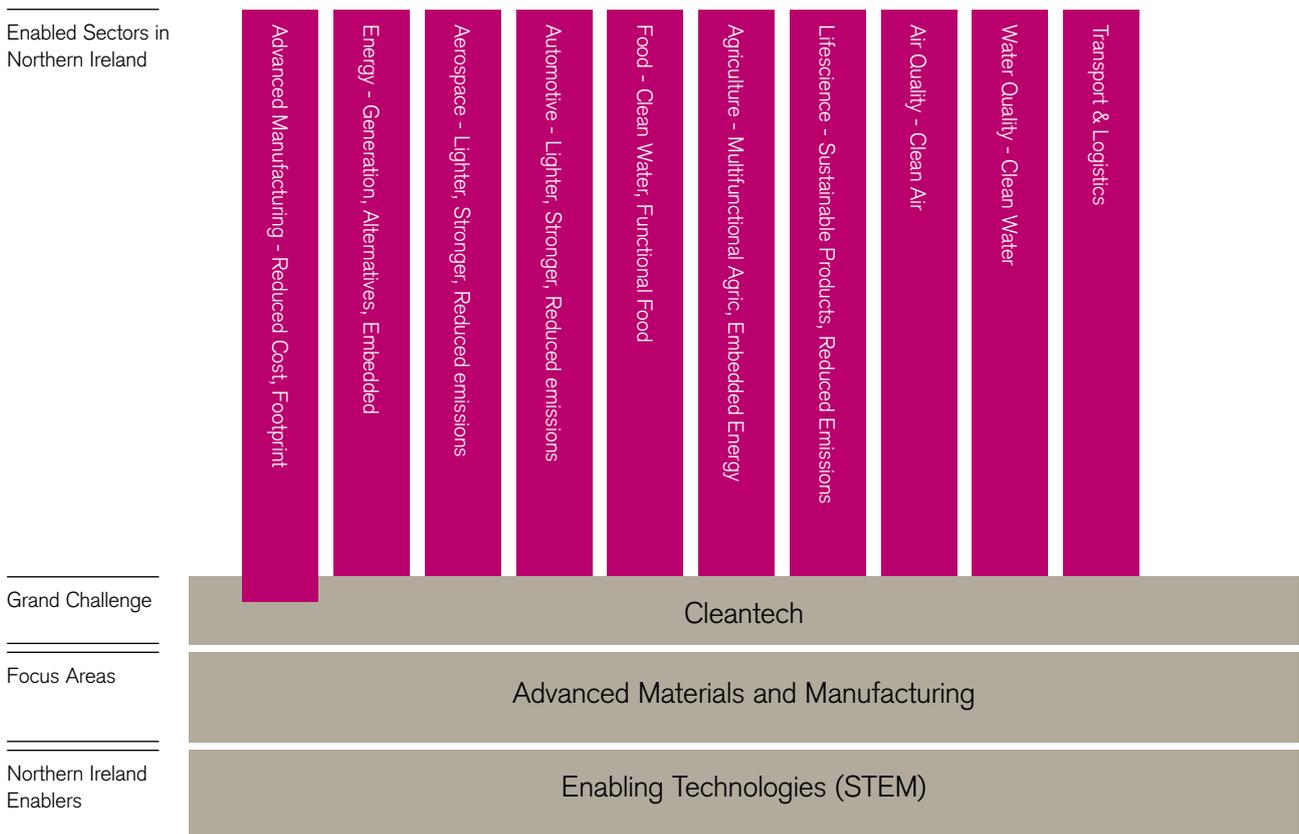
Cleantech encompasses a broad range of products and services, from alternative energy generation to waste water treatment to more resource-efficient industrial processes. There is a compelling need across sectors for a greater focus on environmental and energy considerations<sup>1</sup>. Cleantech is the collective term for the development and bringing to market of products and processes that will allow society to sustain and improve global living standards by increasing the efficiency of existing energy and materials use, while identifying new and sustainable sources of both.

Capability in Cleantech underpins all of the sectors within NI and complies with their individual foresight reports. Moreover, the impact of Cleantech is relevant to the specific Foresight work that has been conducted in the various sectors in NI such as the release of embedded energy and multifunctional agriculture, the ability to derive new lighter, more resilient materials for Aerospace and Automotive, and the need for clean water and clean air which facilitates the quality and branding of the NI food sector.

This positioning can be summarised in Figure B opposite.

<sup>1</sup> The evolving science and politics of Climate Change / Holdren / Harvard University / May 2007

FIGURE B: THE CLEANTECH OPPORTUNITY ENABLES ALL OTHER SECTORS AND CAN FACILITATE NI CREATING A GLOBAL LEADERSHIP POSITION



# MATRIX

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