

**Sustainable Development, Clean Technologies,
Environmental Markets and Converging Markets
2005-2010-2015(hkc.com)
Overview of Development**

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This overview is part of the studies

<http://www.hkc22.com/environmentaltechnology.html>

<http://www.hkc22.com/water.html>

<http://www.hkc22.com/environmentalmarketschina.html>

and others from <http://www.hkc22.com>

Summary

Environmental industry depends on the synergy of total Life Science Industries.

Environmental industry is a highly technology and innovation related industrial branch. Biotechnology and nanotechnology will play dominating roles in the development of this industry. The vulnerable environment of earth, water, air and energy, as well as the soaring world population, demands efficient, safe, and cost reasonable technologies to deal with waste, hazardous materials, cleaning and so on. Environmental industry, together with other industries such as food, water, energy, sustainability, is indispensable for the constitution of a high-quality living space in the 21st Century.

The development of the environmental industry depends largely on the total development of the Life Science industries. Environment affects directly the health of people and the production of food. A society with advanced medical technology and food industry has big concern for environmental protection. The private spending and governmental investment will proportionally increase. Meantime the innovation and industrial basis in other Life Science industries will facilitate the development of environmental industry.

The second stage is additive technology, in which single biotechnical or nanotechnical innovation is applied to improve the performance. This stage serves as a bridge for the transformation from the traditional industry to the new NBNI (nano-bio-neural-info) based industry and has already taken 11,6 % of the market volume, it means 74,6 bn. US\$ in 2003. The NBNI based industry uses integrated new technologies on the molecular scale, which significantly promote the efficiency of dissolving the waste, eliminating the toxicoid

and restoring the environment. A handful of companies have already entered this stage, but the market is only 15 bn. US\$ in 2003. The ideal of environmental technology is zero-emission. All the waste will be sorted and transformed into useful materials in the recycling plants. Some experiments of specific branches have been taken in different countries, for example the total water management center (see 3. 5.). Nevertheless the market is just at the start.

Asia has by far the largest growth rate in the worldwide environmental industry, especially in the „end of pipe“ stage. The reasons are: firstly, the industrialisation of China, India and Southeast Asia causes immense environmental problems. Merely China has seven cities ranked as the most polluted cities in the world; secondly, there is astonishing insufficiency of the basic environmental protection infrastructures. The potential is mammoth; further, the governments vow to improve the deteriorated environment, especially in China, where 2008 Olympics and 2010 Expo will be held; last but not least, the labour cost there is low and suitable for the development of the low-tech but high-labour „end of pipe“ stage.

In other continents, Europe will lead in the technology development. The strong environmental consciousness and limited territory will stimulate european countries to adopt the most up-to-date innovations. USA will be a close competitor because of their gigantic industry scale and advanced Life Science technologies and nanotechnologies.

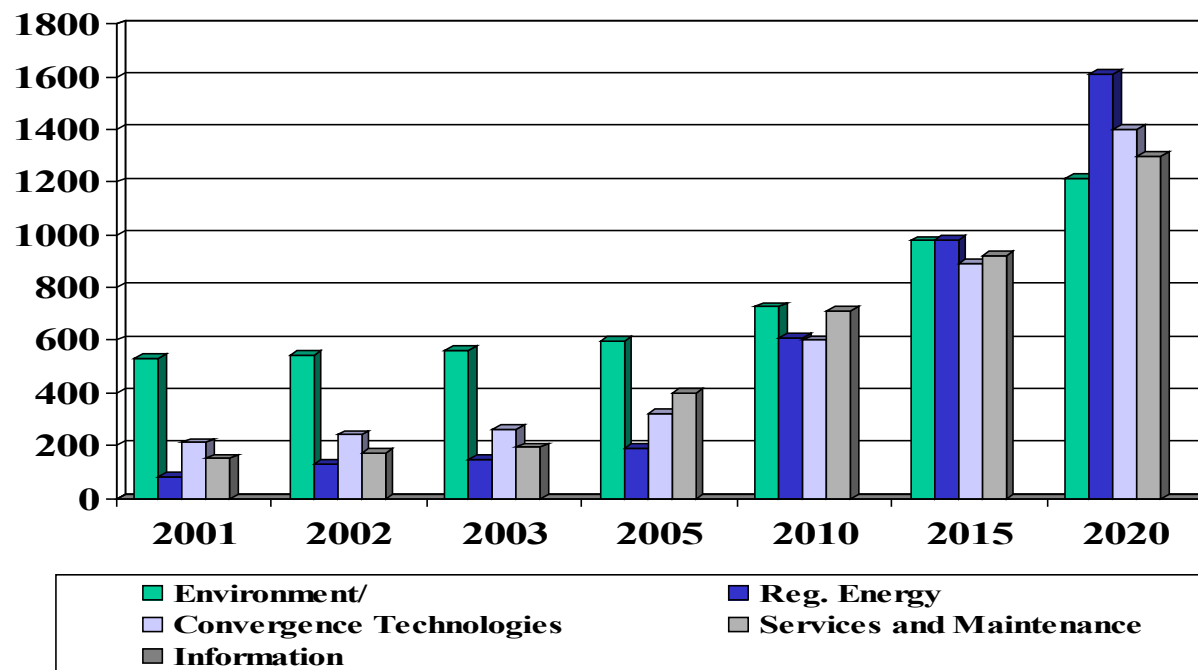
Environmental industries are closely related with waste water industry, regenerative energy and clean energy industries. They will also be included in the statistics of the environmental market as a whole, their detailed analysis could be found in respective chapters.

Markets for Sustainable Development Technologies and Services

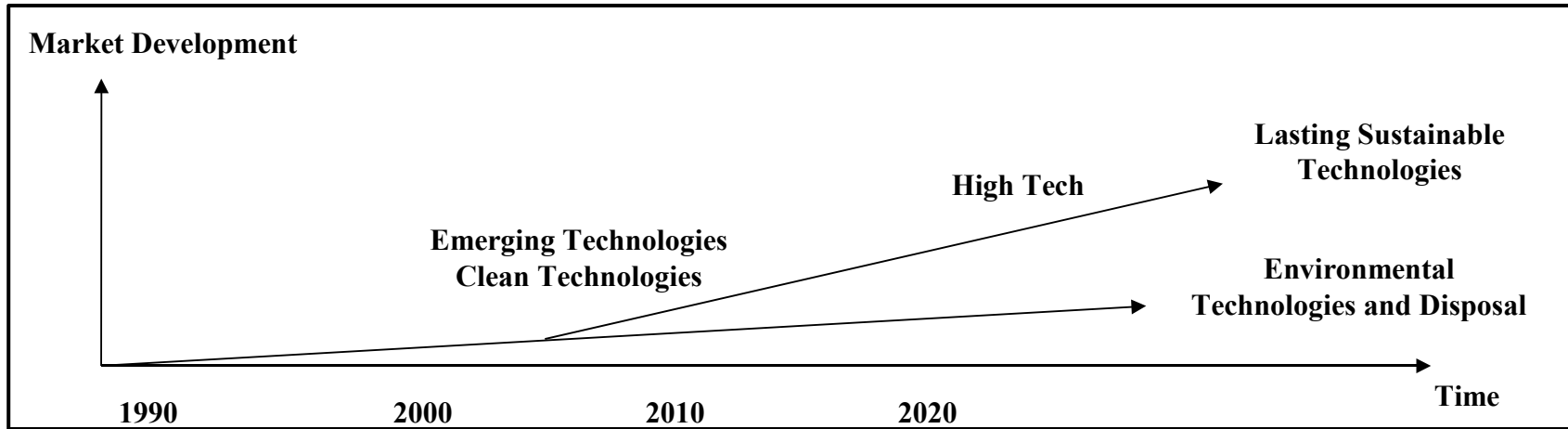
2001-2020 in US\$ Bn.

	2001	2002	2003	2005	2010	2015	2020
Total	969	1.085	1.162	1.505	2.646	3.768	5.524
Environment/Reg. Energy	529	545	560	596	726	978	1214
Convergence Technologies	80	130	149	189	610	980	1.610
Services and Maintenance	210	240	261	320	600	890	1.400
Information	150	170	192	400	710	920	1.300

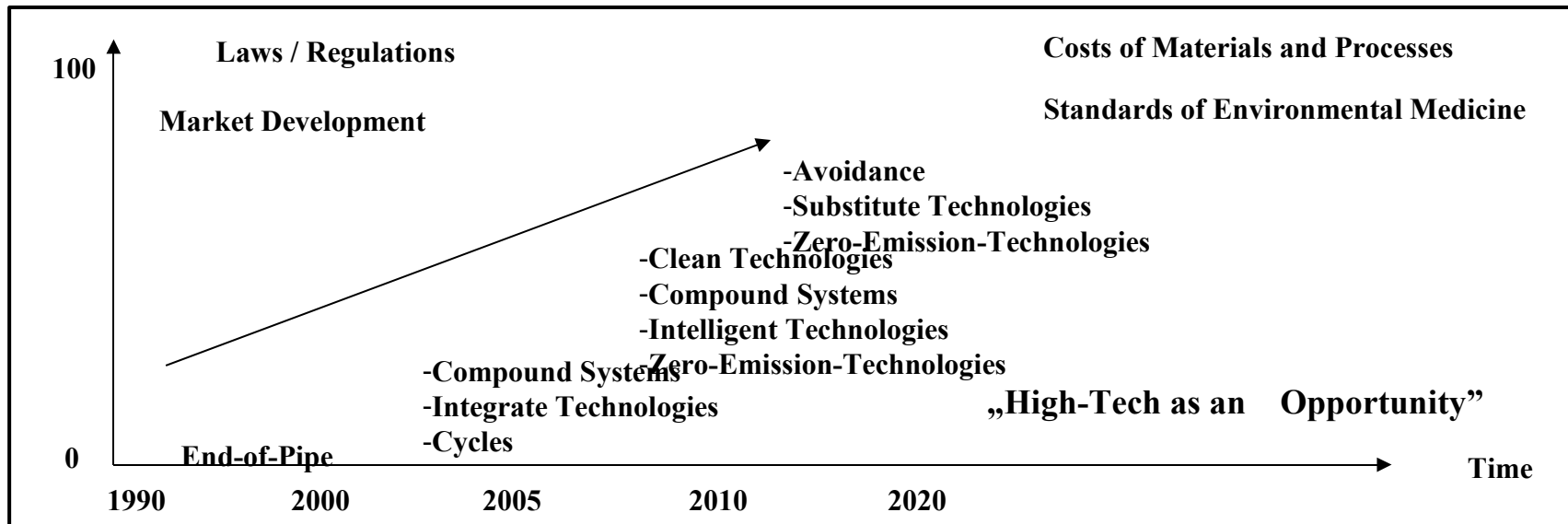
* Graphics without "total"



Markets for Sustainable Development 2020 *Technologies and Services*



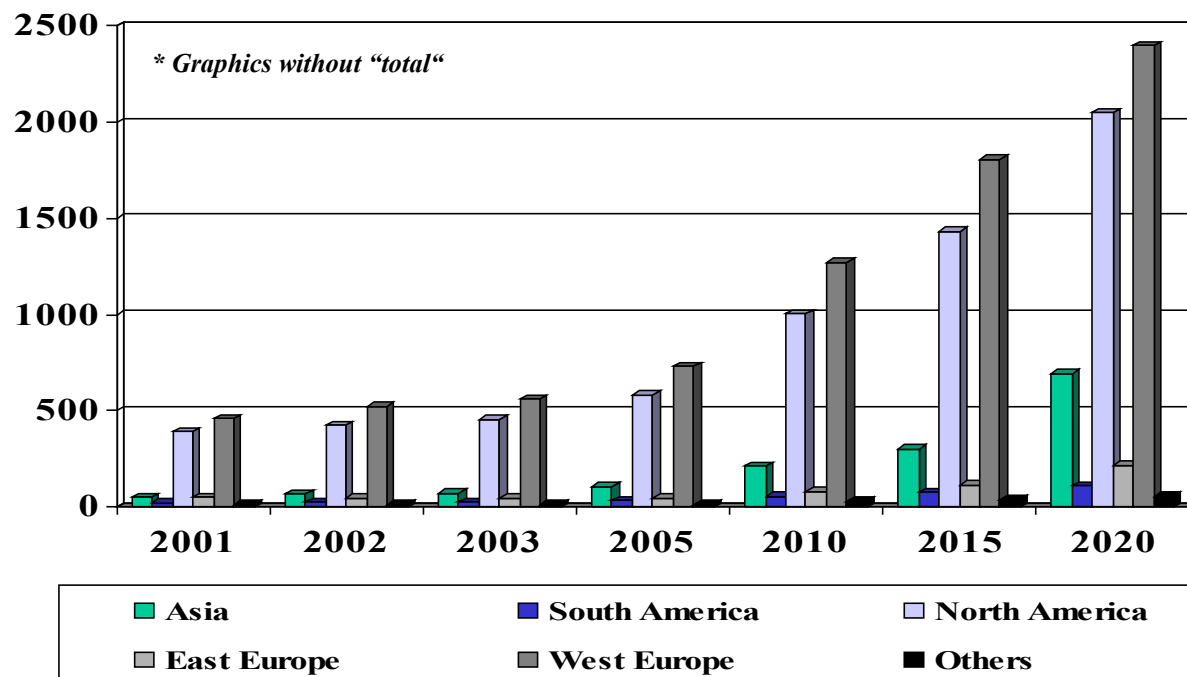
Markets for Sustainable Development 2020 *Applications and Segments*



Markets for Sustainable Development Segments by regions

2001-2020 in US\$ Bn.

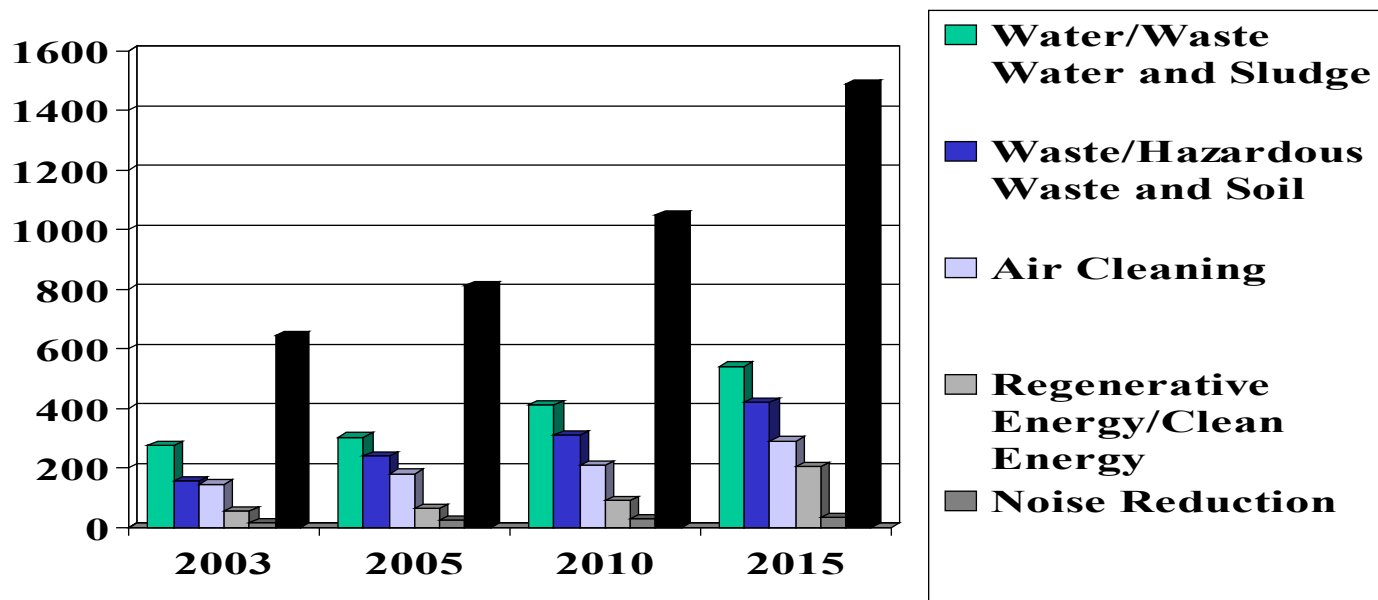
	2001	2002	2003	2005	2010	2015	2020
Total	969	1.085	1.162	1.505	2.646	3.768	5.524
Asia	48	65	70	105	212	301	692
South America	19	22	23	30	53	75	110
North America	388	423	453	583	1.005	1.432	2.049
East Europe	48	43	46	45	79	113	216
West Europe	456	521	558	730	1.270	1.809	2.402
Others	10	11	12	12	27	38	55



Markets for Environmental Industry Worldwide 2003-2010-2015

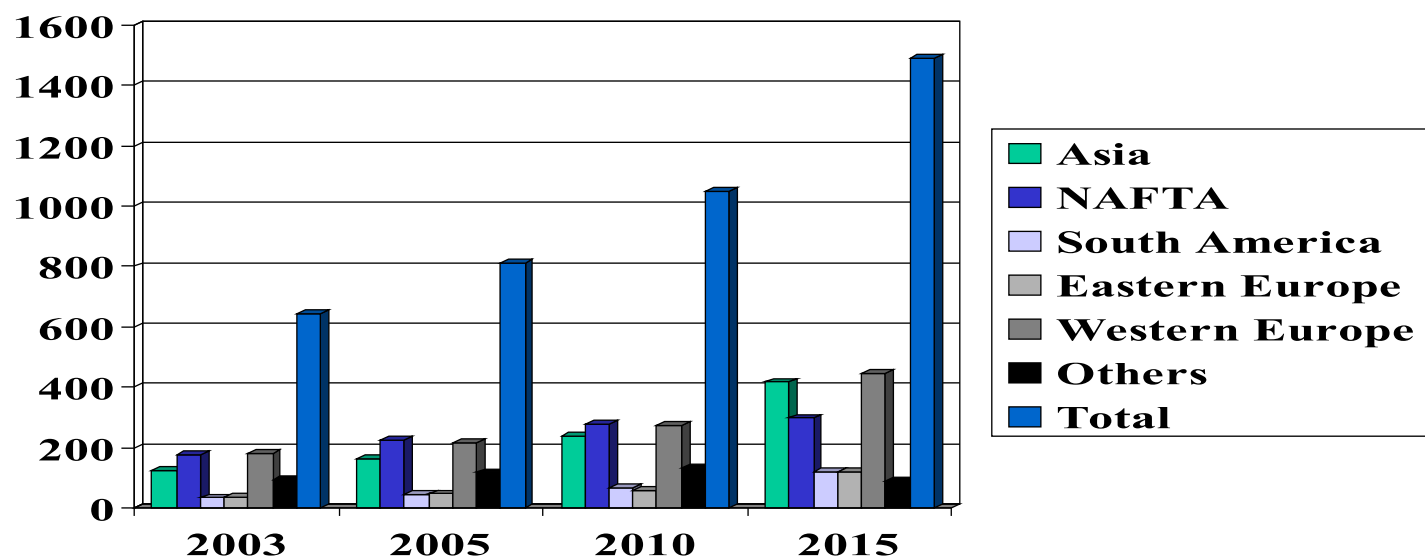
by segments in US\$ bn.

	2003	2005	2010	2015
Water/Waste Water and Sludge	272,8	303,1	412,4	540,7
Waste/Hazardous Waste and Soil	155	240	310	420
Air Cleaning	145	180	210	290
Regenerative Energy/Clean Energy	55,88	65	88,15	205,8
Noise Reduction	14	24	28	32
Total	642,68	812,1	1048,55	1488,5

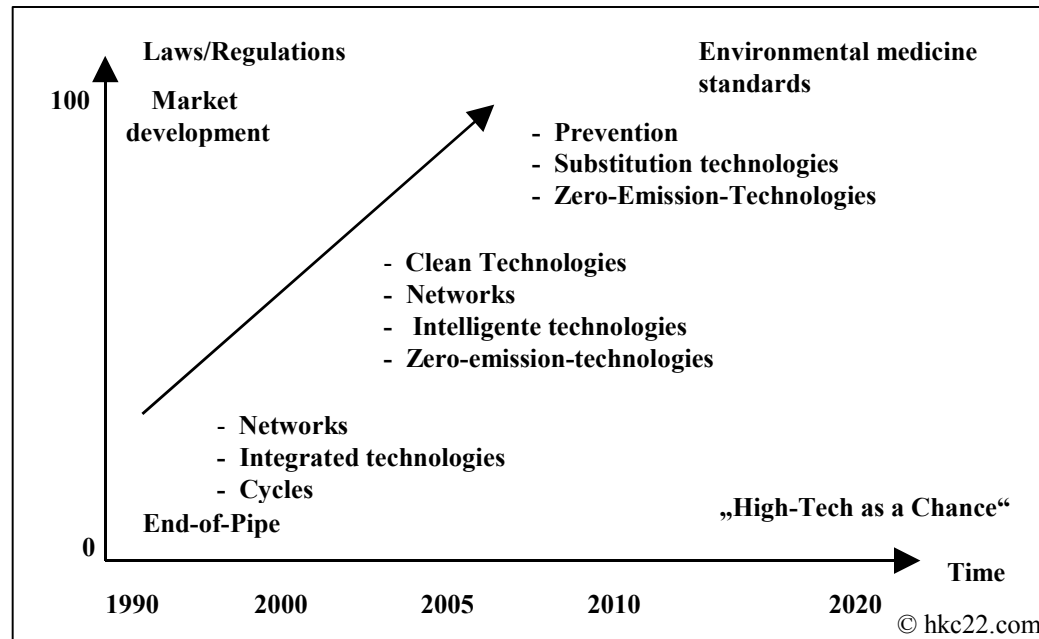


Markets for Environmental Industry Worldwide 2003-2010-2015 by regions in US\$ bn.

	2003	2005	2010	2015
Asia	122,80	163,75	239,59	416,78
NAFTA	177,88	224,99	279,05	297,7
South America	33,28	42,60	64,83	119,08
Eastern Europe	35,58	46,60	59,19	119,08
Western Europe	181,33	217,00	272,00	446,55
Others	91,81	117,16	133,89	89,31
Total	642,68	812,1	1048,55	1488,5



Strategic Development of the Technologies



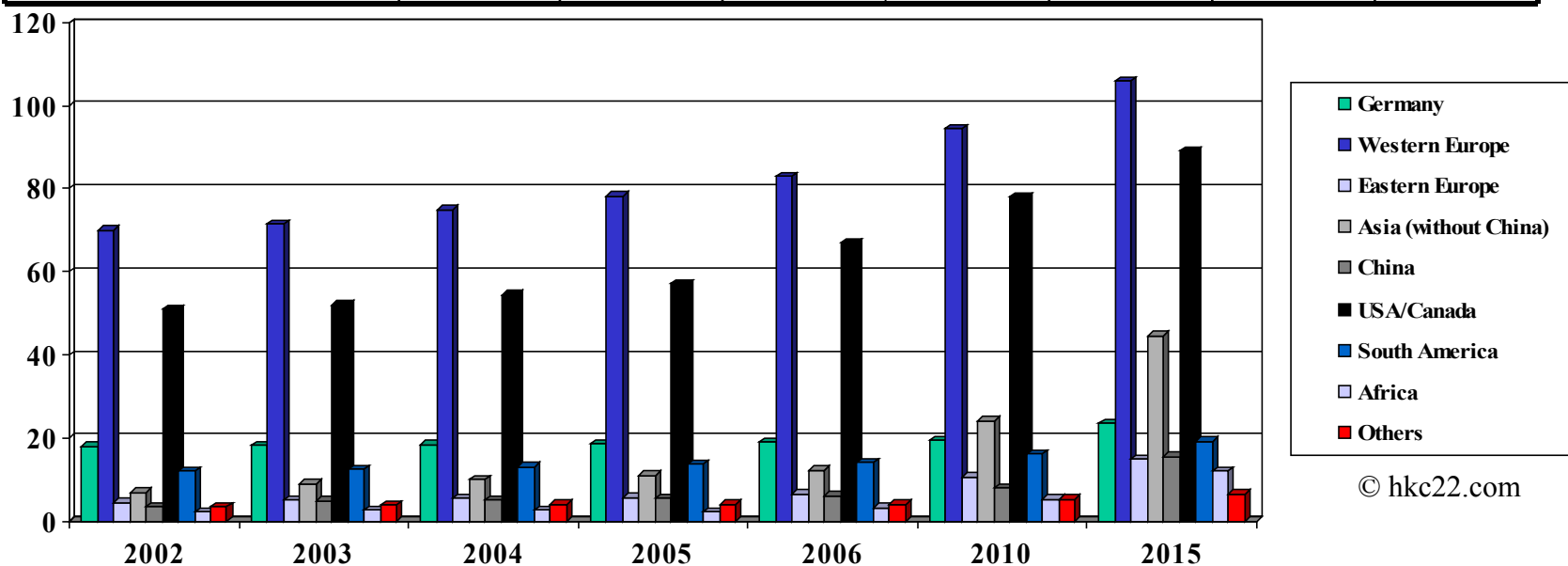
The governmental standards of environmental regulations are steadily rising together with the technical advances. The scientific understanding raises the requirement for a better environment. The technical innovation could realize such requirements. In the past the environmental standard is only to avoid the spreading of plagues or to make the air suitable for breathing, today people think about a city like a garden; in the future, environment will be an important chain for the whole system of healthcare. Environmental standards will reach the same level as the medical standards.

To reach this level, it is necessary to launch a more thorough campaign. From the conventional end-of-pipe methods to integrated environmental management and to zeroemission, the environmental regulations extend to broader and broader spectrum of the industries. The environmental industry is not restricted to the conventional waste treatment any more, but an indispensable aspect in all the processes of manufacturing. High-techs, above all the nano- and biotechnologies, make the industries sustainable and give the environmental market a huge momentum of development.

World Markets for Waste Water Treatment

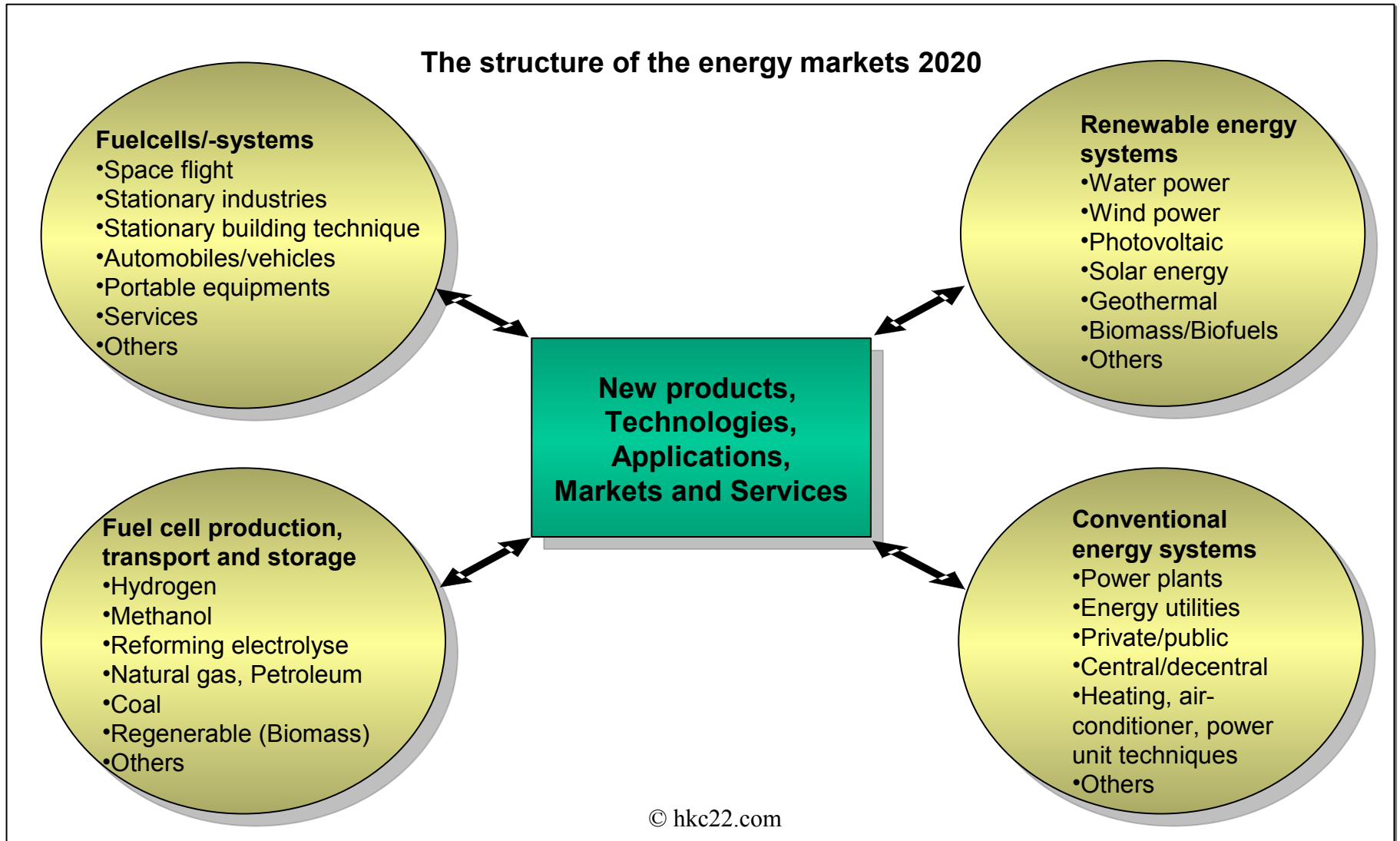
2002-2010-2015 (worldwide by regions in Bn. US\$)

	2002	2003	2004	2005	2006	2010	2015
Germany	18,0	18,2	18,43	18,72	19,0	19,5	23,5
Western Europe	70,0	71,5	74,93	77,77	82,9	94,5	106,0
Eastern Europe	4,5	5,1	5,34	5,58	6,5	10,6	14,9
Asia (without China)	6,9	8,9	9,97	10,79	12,2	24,1	44,6
China	3,4	4,9	5,13	5,36	6,1	7,9	15,5
USA/Canada	51,0	52,0	54,59	57,95	67,0	78,0	89,1
South America	12,0	12,5	13,10	13,43	14,0	16,0	19,1
Africa	2,1	2,5	2,66	2,9	3,1	5,2	12,0
Others	3,4	3,9	3,95	4,0	4,1	5,2	6,5
Total	171,3	179,5	188,1	196,5	214,9	261	331,2



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The Structure of the Energy Markets 2020



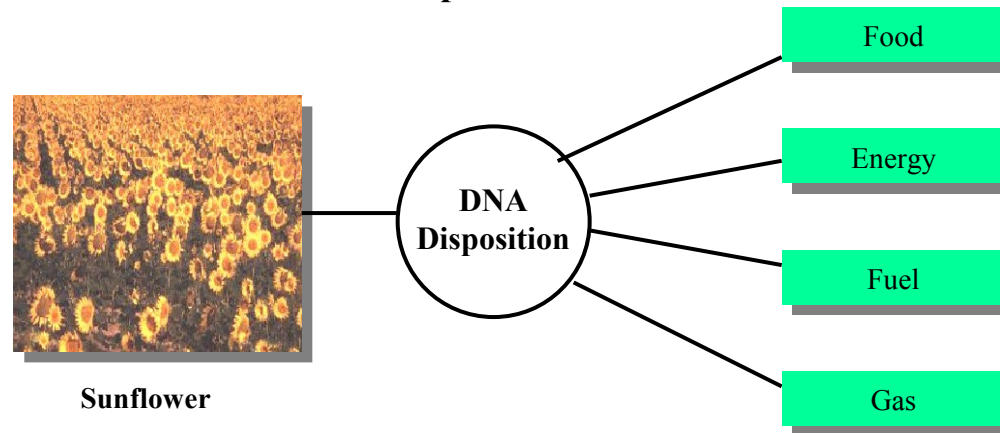
Energy

Overview of Market and Development

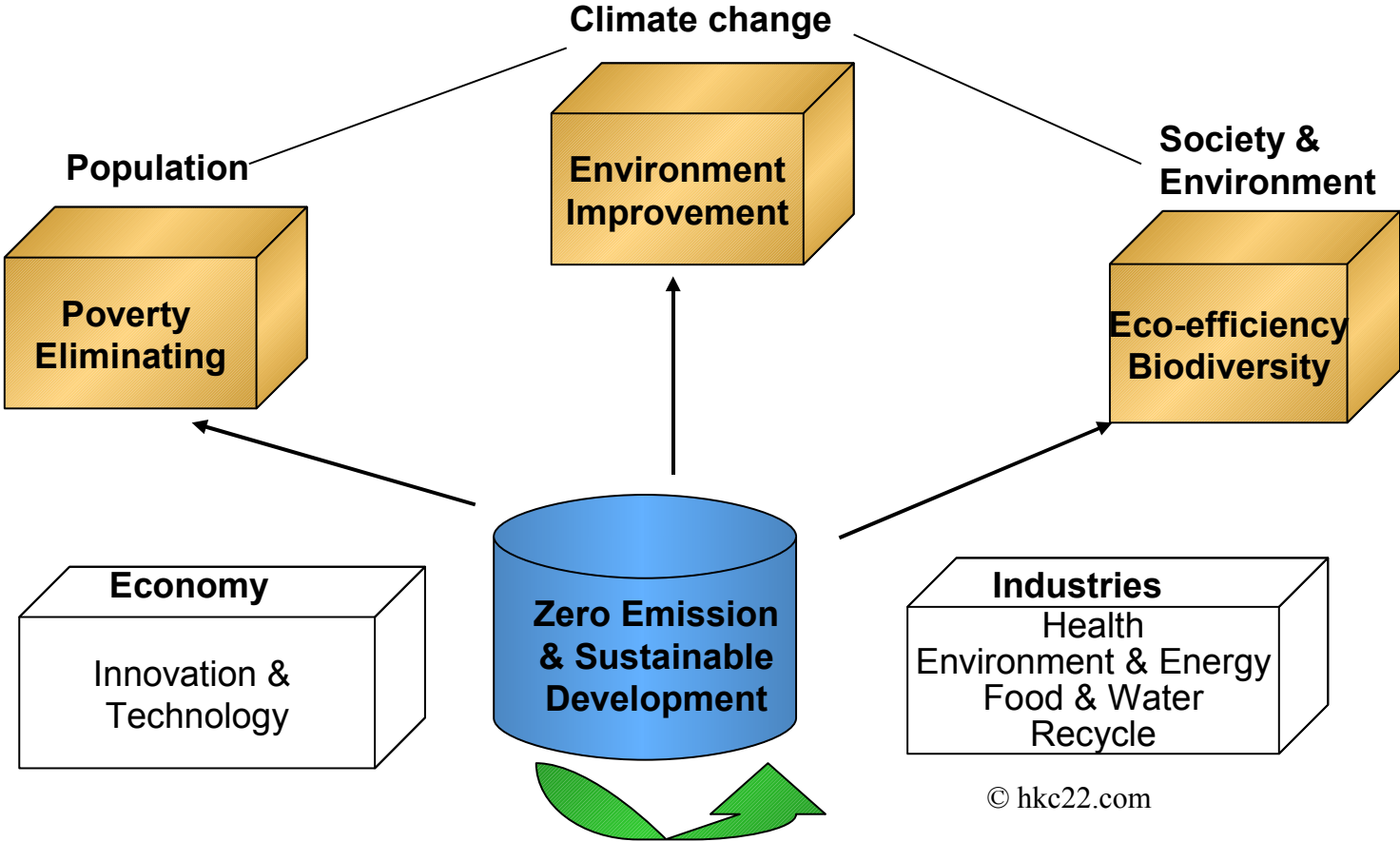
- The future energy comes from clean and sustainable sources, such as sunflowers
- Only 40% of the world population have access to energy today
- High potentials for the market of regenerative energy
- Clean energy market grows with a rate of over 20% per annum in the next 10 years
- New innovation and technologies are the keys to energy generation and sustainability

In the future, a large number of plants will be used specifically to generate energy. For example, sun flowers can be altered to fuel when their DNA structure are properly redesigned. The energy of the future will be regenerative and sustainable. The generation and storage of energy will be the biggest growth market in the next 20 years.

Sunflowers can be foodstuff or fuel, depending on the disposition of DNA



Overview of Zero Emission and Sustainable Development



Convergence and the Future

The development of the advances in converging technologies demonstrates the trend of the future industries. The accelerating convergence of technologies enables new devices, new applications, new industries and entrances into new dimensions.

This development will substantially affect the fields of health and safety, economic, social and political systems, and business. Life span will increase, quality of life will improve, economy will prosper and society will change.

The new technologies often challenge the traditional barriers. The acceptance of the controversial innovations will largely influence the technological development and the future in each country. The key aspects are:

- Accelerating technological innovation
- Increasing multidisciplinary synergy
- Competition for leadership in technology development
- Continued globalisation

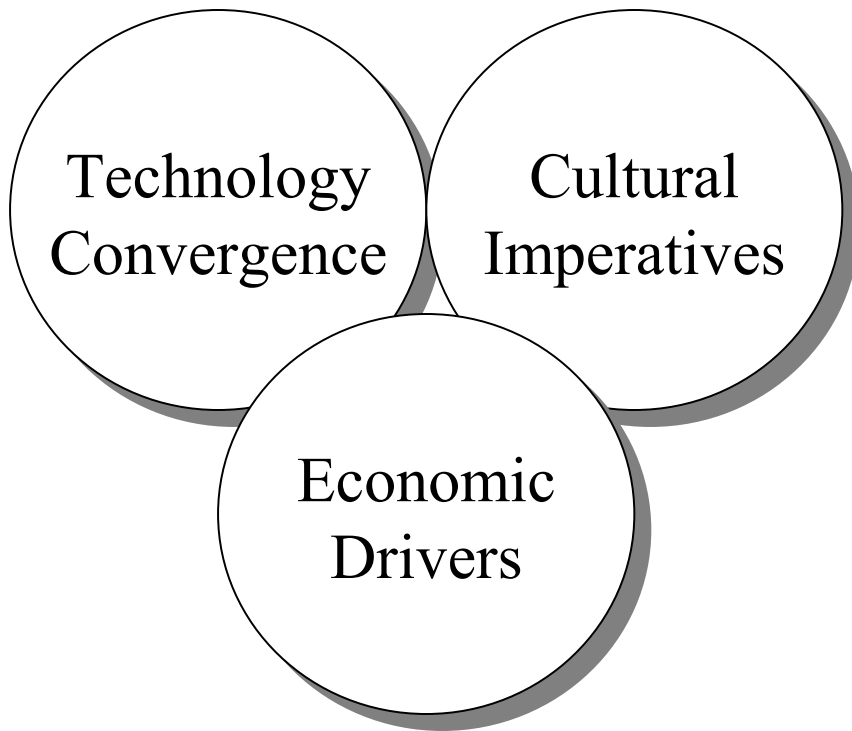
New Developments Need New Answers

The TimeLife concept concentrates on six areas and the fundamentals of companies, their future developments in research and science, and the ability to commercialize.

The six areas are:

- **Structure of Matter**
- **Earth and Environment**
- **Health**
- **Information/Communication**
- **Energy**
- **Key Technologies**

Science and industries worldwide are on the way to a molecular future. Convergence increases the speed through new technologies and countries without barriers.

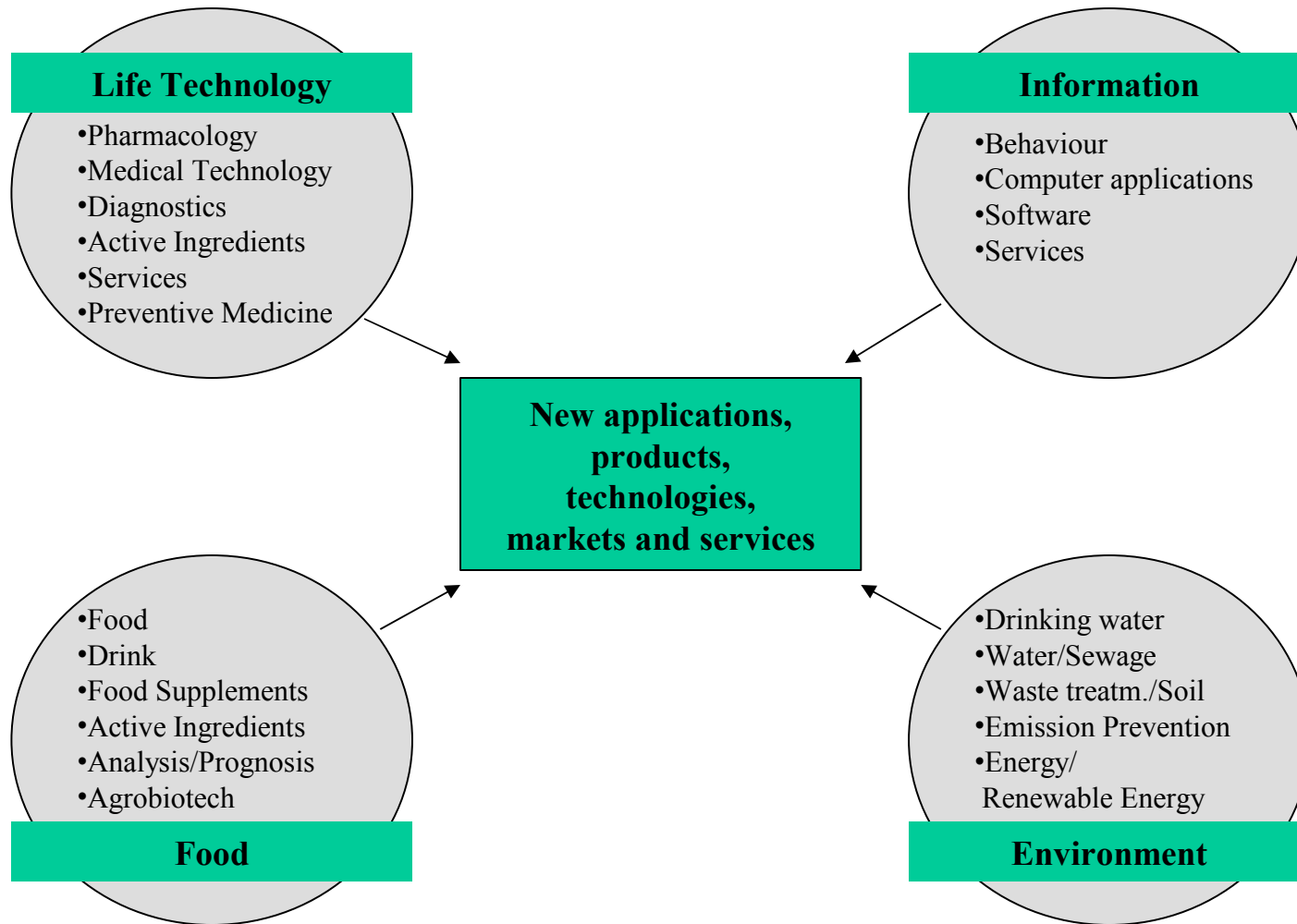


The Keys of Convergence:

- Decoding and use of DNA
- Decoding of brain function
- Development of microsystems
- Nanotechnology and pico
- Molecular engineering
- Converging Nano-Bio-Neural and Information

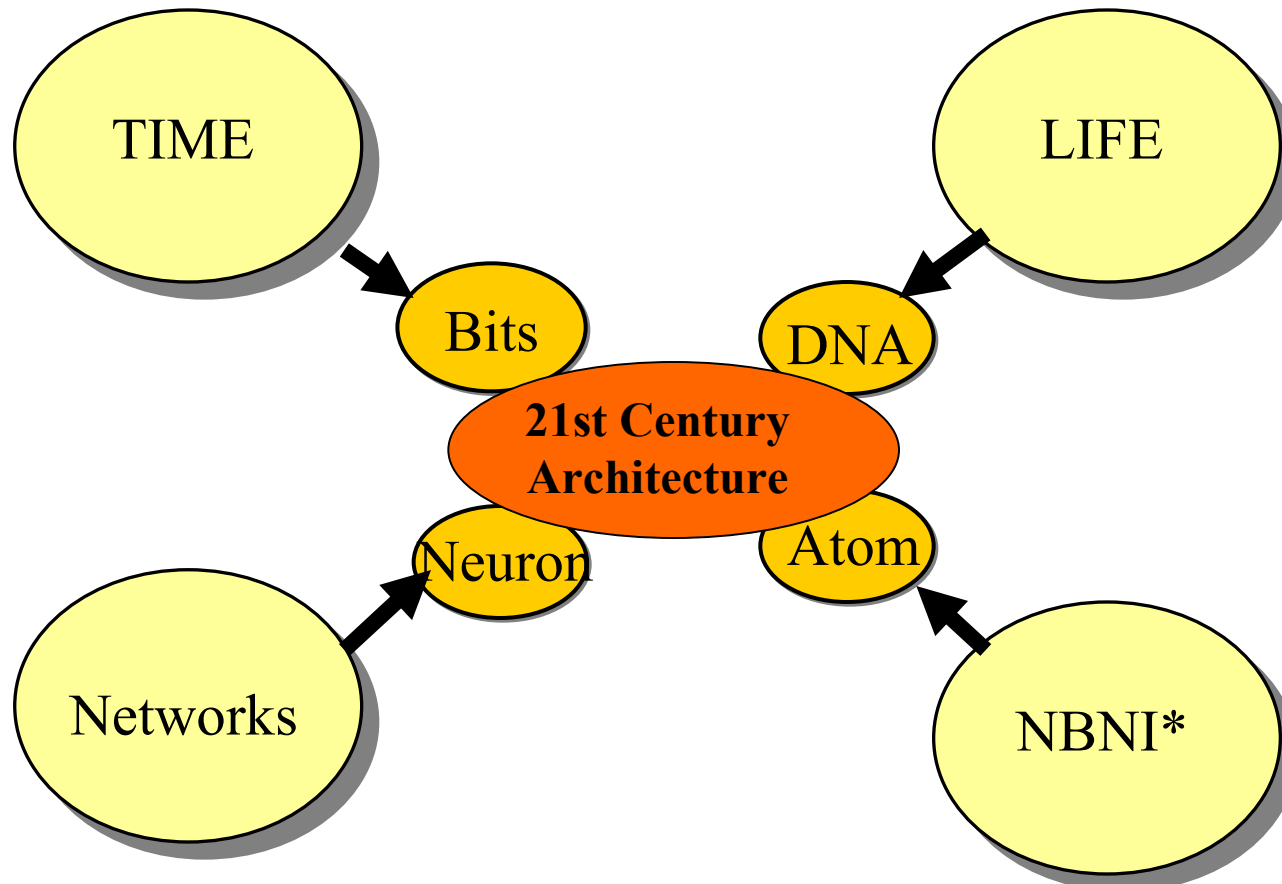
LIFE Industries

Today's industries are converging with increasing speed in the last years.



The Changing Infrastructure of Technologies and Industries Leads to Nano-Bio-Neural-Information (NBNI)

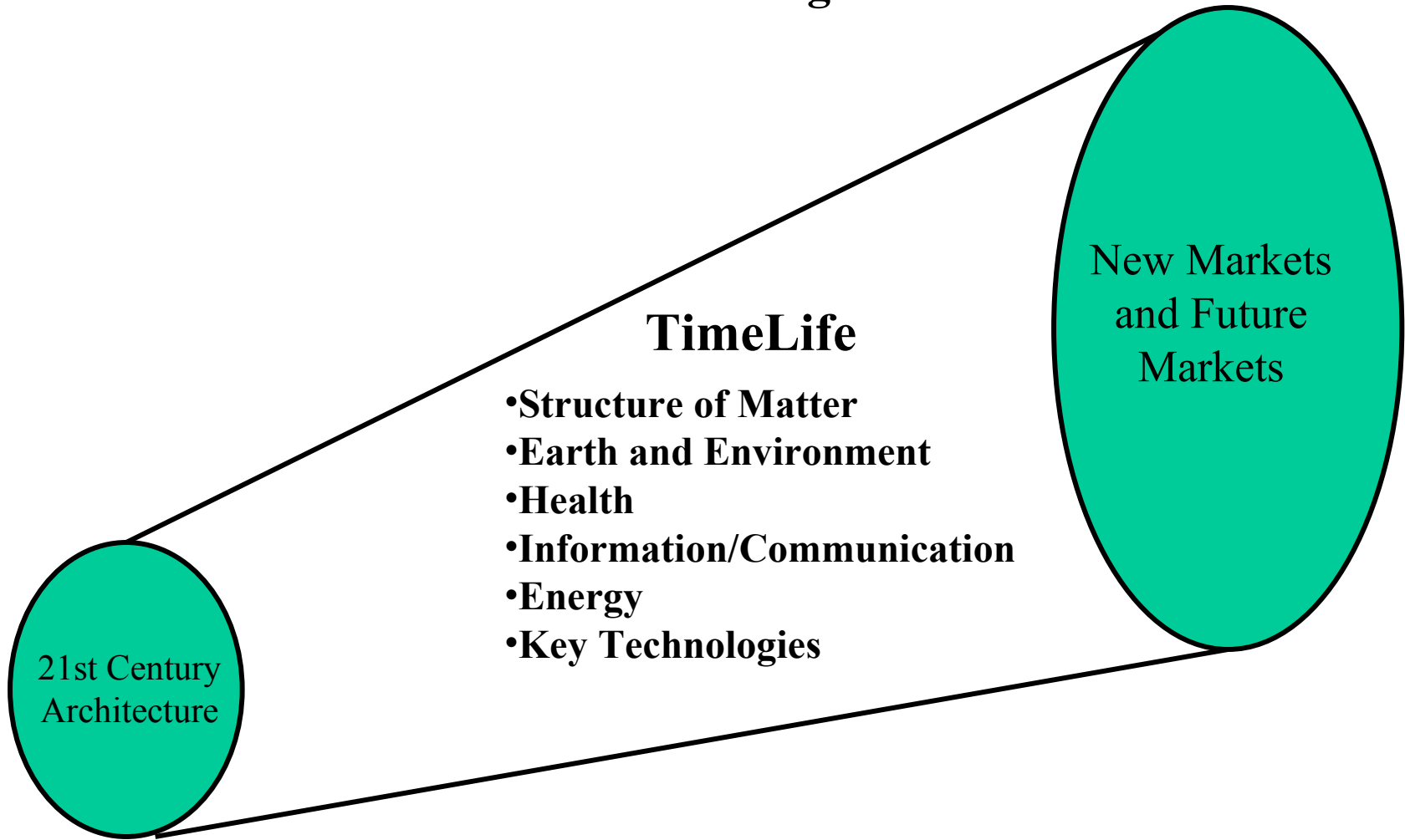
It is a Fundamental Enabling Technology



* *Nano-Bio-Neural-Information*

The Markets of the Converged TimeLife

Markets



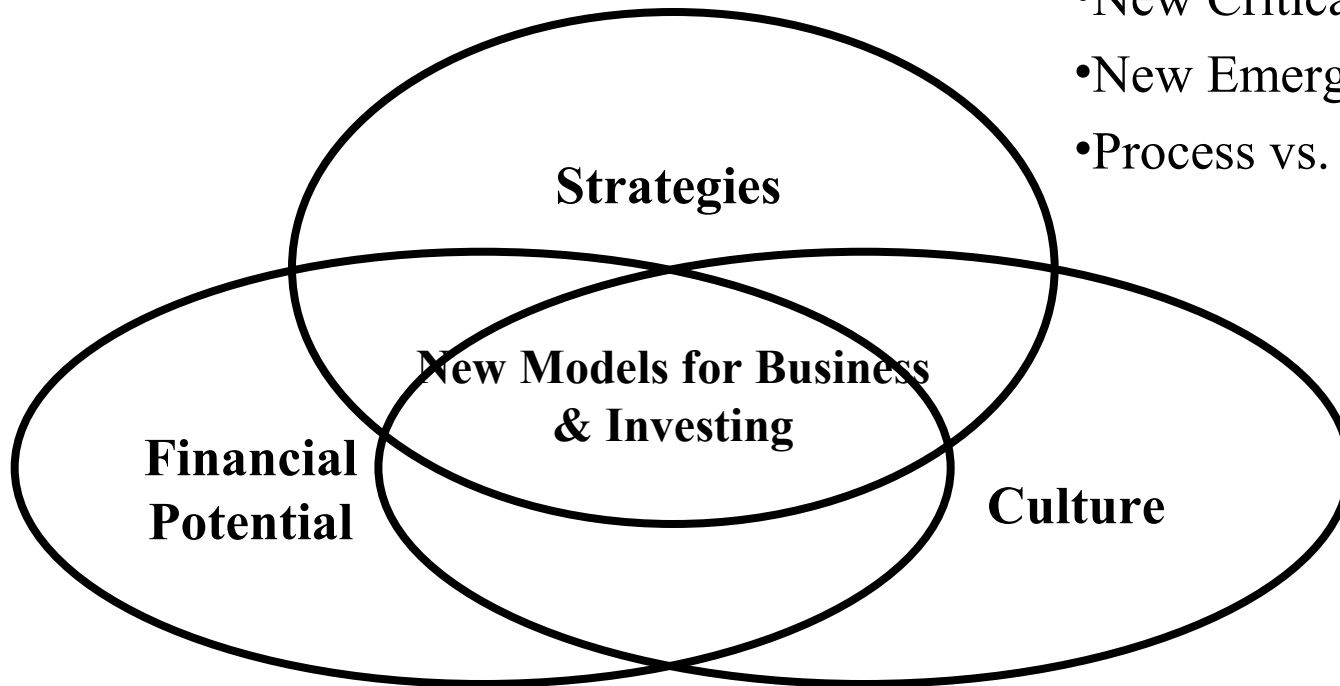
21st Century
Architecture

New Markets
and Future
Markets

Time

The Flow of the Markets Needs New Business and Investing Models

- Converging Technologies and Interdependence
- New Critical Mass Development
- New Emergent Business Models
- Process vs. Product



Environmental Technologies and Markets

Worldwide 2004-2005-2010-2015

Summary of the Total Study: Environmental Technologies

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