SHARING OUR FUTURE: IRELAND 2025

Strategic Policy Requirements for Enterprise Development

Forfás

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Executive Summary

1. Introduction

The current difficult economic conditions have called for significant actions and the short-term measures to restore stability to the public finances, sustainability to the banking system, sustaining jobs and well-being, and improving our competitiveness. It is important, however, that decisions also take account of the need for a longer-term framework that underpins our national prosperity and well-being into the future.

This report starts from the position that sustaining jobs, growth and social development for the future is dependent on having a strong and competitive enterprise base. It seeks to provide a framework for longer-term policy analysis and decision-making. The central question addressed is as follows:

In the context of broader societal goals such as prosperity and full employment, social justice and equity, security, liberty and well-being…..

What decisions should be made to ensure a sustainable, competitive enterprise sector in 2025 and in 2040?.

The required decisions will have to be taken in a context of rapid and far-reaching change. This report provides an analysis of the scope, scale and speed of some of the key prospective future forces of change and potential implications nationally and internationally, including in the areas of globalisation, energy, innovation and technology, lifestyles and the environment. The report also identifies a series of strategic policy requirements, forming an agenda for action. Section 2 sets out the key forces of change, section 3 outlines the cross-cutting messages from the scenarios and the overarching principles and section 4 outlines the necessary actions in response.

As part of the analysis four socio-economic scenarios were developed that envision a very wide range of possibilities for Ireland's future both as an economy and as a society. The most important messages that emerged from the process of defining and elaborating the four scenarios are that:

- Further discontinuities in the global economy and political systems are within the range of possibilities for the medium and long-term;
- Changes confronting the global economy between now and 2025 are likely to be major and far-reaching; and
- Preparations will have to begin soon both to address some of the more significant challenges and to take advantage of potential opportunities.

2. The Forces of Change to 2025

Dramatic change in global and national economies and economic systems is increasing and is likely to accelerate further over the coming decades. The most significant changes are likely to be those relating to further population growth, the dynamics of globalisation, energy and climate change, advances in information and communications technologies, the potential for further conflict globally, changes in governance and in infrastructure, education and social values, and quality of life.

Eleven key forces of change impacting on Ireland to 2025 were identified as follows:

- Demographics
- Technology, Innovation and Entrepreneurship
- Education and Skills
- Social Values and Quality of Life
- Globalisation
- Infrastructure
- Governance and Regulation
- Energy Supply and Security
- Climate Change
- Natural Resources
- Conflict

2.1 Demographics

Increasing global population

The world's population is projected by the UN to continue to grow over the coming decades, rising from 6.6 billion in 2005 to 9.2 billion by 2050.

Population ageing

The challenge for many developed economies is that of population ageing. The population of the EU is expected to be slightly lower but much older in 2050. In addition to the pressures for increased public spending resulting from an ageing population, such population ageing will have a significant impact on economic growth, consumption and general economic activity in these developed economies, particularly in the EU.

Ireland's age structure … higher dependency ratios

Population growth in Ireland is also projected to remain strong, though perhaps not as strong as over recent years. While it is likely that inward migration will slow markedly over the coming years (and indeed we are likely to see a return of some net outward migration in the next few years), population growth is likely to continue to remain strong due to high birth rates. The CSO has projected that the population of the State could potentially increase by up to 60 per cent to over 7 million by 2041, from 4.4 million in 2008. Currently the age structure of the Irish population is younger than most other countries in the EU and will remain so until 2016. Ireland's labour force in absolute terms is projected to continue to grow

modestly up to about 2040 and to start to decline thereafter as the population ages.

Challenges include - increased age related expenditure, decline in labour force growth, spatial dimensions

For Ireland, these changes in population will impact on prospects for future economic growth and on a number of areas of public policy. Labour force growth will continue to make a contribution to overall economic growth over the period to 2020, but thereafter there will be a higher reliance on productivity growth. This will be a major long-term challenge for the economy. Population ageing will also give rise to significant requirements for the necessary economic and social infrastructures and services and increased demands on the public finances for age-related expenditure in areas of pensions, healthcare and age-related care. There will be regional planning and spatial development dimensions to be considered as strategic decisions are needed on where the increased population will live, work and play in Ireland over the coming decades.

2.2 Technology, Innovation and Entrepreneurship

Innovation widely defined as a central driver for wealth creation

Innovation in all its dimensions will continue as the central driver of wealth creation, economic progress and prosperity in the coming decades. Innovation will no longer be about technological innovation but will include organisation and business model innovation, workplace innovation, creativity and design.

Pace and scope of technology change ….technology absorption is key

The scope and pace of technology change will have enormous impacts on the operating environments for businesses and the economy as a whole. It will influence the way we work and the way we live, and will require changing, adaptable and flexible business models. For the most part the technological breakthroughs of the future are as likely to be developed abroad as they are in Ireland – the key is being able to absorb, adapt and apply ideas for economic benefit and well-being.

Importance of open collaboration

Technological advances and innovation will increasingly require more open collaboration and flows of information and of people between research and business to ensure that opportunities are realised.

Pervasive technologies... bio and nanotech, ICTs

Biotechnology, nanotechnology and cognitive sciences will increasingly pervade all aspects of economic and social activity and in product and services development. High costs, be they energy, environment, transport or food, will force innovation in many areas and provide many opportunities for business. Advances in information and communication technologies (ICTs) will continue as key factors in productivity growth, globalisation and the emergence of new business models in the future.

Enterprise response….

Enterprises will increasingly require access to an entrepreneurial skills base that can capture and exploit those technologies so as to respond to market demands and create new markets also.

2.3 Education and Skills

Global pressures on education system...

A world-class education system is an imperative for economic development and overall competitiveness. Our education and training systems and achievements are a significant strength for Ireland, a key factor in the success of the Irish economy to date, and an integral part of overall competitiveness. Because of the rapidly changing global environment to which Ireland needs to respond, the Irish education system will be under intense pressure to further improve educational outcomes to support increased living standards into the future.

Education as a key strength for Ireland

The Irish education system is facing a number of widely recognised pressures and challenges over the coming 15-20 years. These include demographic challenges, changing customer-client requirements, technological developments in on-line and distance education, a greater emphasis on continuing education and lifelong learning by individuals, changing working environments and increasing competition for students among providers. In the medium term the education system has an important role to play in upskilling the labour force, in particular those recently unemployed.

Further reform

To promote economic and social progress...

There is a need for further reform, concentration and consolidation of the higher education system, in particular to provide greater autonomy for the universities, to strengthen the linkages with the institutes of technology and to ensure the system can respond appropriately to future skills needs and shortages.

Flexibility within the education system

The future skills needs of Irish society and the economy will change as we move to a more services-oriented economy. The education system will need to respond to this in a highly flexible, adaptable and demand driven way. The National Skills Strategy gives direction in this regard.

World-class skills, education and training have been identified as a crucial area in which Ireland can develop competitive advantage. Significant challenges present themselves if Ireland is to achieve this. Entrepreneurship will play an ever increasing role with high level activity being driven by the acceptance of failure as part of success.

2.4 Social Values and Quality of Life

Quality of life as a major driver of change

In developed countries quality of life is becoming a major driver of change. Improved quality of life is not just a by-product of economic success but increasingly a determinant of it. Quality of life is hard to define or measure, but is a critical priority for governments, and in the life choices of individuals.

Quality of life in Ireland while high is coming under stress

The quality of life of an individual depends on both the quality of society and on factors that are specific to an individual's circumstances. The material assets of a society and its ability to provide jobs and income are of paramount importance. Other societal factors are also important, such as the quality of the political and social culture, the environment and infrastructures. For most people it is also important that they see society

progressing as a whole, and the way in which society as a whole progresses reflects how people's quality of life changes over time. Some trends indicate that societies however may in the future tend to be more stratified than unified and could in effect become more intolerant than accepting. Communities could be more physically and geographically concentrated with a greater emphasis on self-reliance and on using local resources such as energy, food and leisure to best effect.

Quality of life has improved markedly on average in Ireland over recent decades and Irish people have been consistently reported as among the happiest in the EU. But there are signs that the changed pace of economic growth has placed demands on scarce resources and that the quality of life has suffered as a consequence, in particular in relation to commuting and access to amenities and public services.

Healthcare provision as an important aspect of well-being

Healthcare is also an important aspect of well-being and quality of life of an individual. Care for the elderly will become an even greater concern. Ireland will have a greater proportion of elderly people in the population by 2025 and life expectancy will have increased further. Healthcare costs are likely to continue to increase and with technological advancements personalised genetic-based care will also be more pervasive.

Understanding, responding to and building on these differences in all areas of policy and strategy in both public and private sectors will be crucial to future success, particularly in the international competition for talent and skills.

2.5 Globalisation

.. an interconnected global economy shaped by structural change

We now live in an interconnected global economy. The longer-term outlook for growth remains positive despite the difficulties of the current financial crisis and economic recession. The economic future will increasingly be influenced by structural changes in the global marketplace. Slower growth in developed economies and rapid catch-up among developing nations, together with a significant increase in world population, the impacts of climate change and a changing technological environment, will all play a role in shaping the future global economy.

.. importance of the developing economies

…. rising population and increasing consumption patterns

Economic growth in Europe and the US is likely to be lower over the coming decades due to slowing population growth and ageing and peaking participation rates. However, other parts of the world are likely to continue to experience high rates of economic growth as they catch up with currently developed economies, particularly in the medium to longer-term. Rising populations and growing consumption, together with increased access to capital and technology, will drive growth in these regions. The developing economies share of world trade is projected by the World Bank to reach 50 per cent by 2030, from 30 per cent today. Their share of global GDP is forecast to reach 60 per cent by then, in purchasing power parity terms.

Long-term outlook for the Irish economy looks positive

The Irish economy has the potential to continue to prosper in the next two decades, notwithstanding the current economic downturn. Assuming economic recovery beginning in 2011 the most recent estimates from the Economic and Social Research Institute (ESRI) are that this could bring a return of growth for Ireland in 2012, achieving rates of growth of up to five per cent per annum to 2015.

Competition for FDI … new opportunities in high growth, high productivity areas

International competition for investment will intensify. Increasing Irish skills and strong differentiated marketing will be essential success factors in targeting corporate and individual inward investment. China, as a key global investor, will be a major source of corporate investment. Ireland's ability to attract investment and new business skills and talent into the economy has been critical to growth over the last decade. Ireland needs to continue looking for new opportunities in related high growth, high productivity areas, building on skills, competencies and infrastructure endowments we have developed over recent decades to secure the next wave of investment.

Ireland as a gateway and cultural link

Ireland has provided an attractive gateway for international investors to access European and wider markets and has provided a link between cultures and continents. Of necessity Ireland is a flexible, responsive, outward looking country and economy. A real risk for Ireland is complacency and continuing to rely on past successes for growth and prosperity. The key objective is building new sources of competitive advantage.

2.6 Infrastructure

..world class infrastructure is necessary...

…..requiring substantial investment

Dispersed population patterns and rapid population growth combined with decades of low investment in physical infrastructure prior to the 1990's have led to a range of infrastructure deficits in Ireland, as compared to other OECD economies. World-class physical infrastructures are necessary for the continued competitiveness of firms in Ireland, as well as for making a direct contribution to an improved quality of life. Substantial infrastructure investment nationally and regionally is required over the medium to longer-term, notwithstanding the current economic slowdown.

Vision, coordination and planning …

Prioritisation of transport, energy, broadband, waste, water investments

Longer-term vision, coordinated implementation and planning for and strengthening Ireland's cities and improving the contribution of each of our regions to national competitiveness are therefore of vital importance. Enhancing the contribution of each region to national competitiveness and achieving balanced patterns for growth in the context of significant demographic changes in the future require continued investment in infrastructure development. There are a number of infrastructure issues of critical importance to continued growth and competitiveness that now need to be prioritised, in particular transport, energy, broadband, and waste management. As the digital economy grows and advanced ICTs pervade all aspects of trade and commerce, next generation broadband and other infrastructure have the potential to bridge the competitiveness gap by allowing Irish firms to advance in ICT, technical, and environmental goods

and services.

2.7 Governance and Regulation

Increasing role of international organisations

The UN and its agencies, the World Bank, the WTO and other international organisations, even multinational companies, will have an increasing role in the future in satisfactorily managing global issues such as the trade effects of increased globalisation, poverty, distribution of development aid, climate change, internecine wars and issues resulting in the mass dislocation of people and the movement of refugees.

The development of international agreements in addressing many of the key energy and climate change and economic and regulatory issues will make it more important for national governments to find ways to influence the outcomes of global agreements through international coalition and partnering on national issues. From Ireland's perspective, the role of the EU in such international decision-making is likely to increase.

Need for effective governance at global and national levels

Future challenges, globally and nationally, will become more complex and more interrelated. The response to these challenges will need multifaceted and sophisticated policies that require an effective governance system to deliver.

The EU's influence internationally will depend on its ability to manage internal tensions or disagreements and how it copes with being one among a number of economic giants. Many of the wider policy initiatives for combating climate change, conserving energy or fundamentally changing the nature of public transport will rely on effective governance at every level from local to international.

Power of public debate

The role and power of public debate is changing. The advance of the Internet and technology means that people are becoming more connected than ever before. People's awareness of global issues is on the increase. The greater intervention of ordinary people, celebrities and the public system enabled by technological change is fundamentally changing the nature of public debate.

…role of technology

The need for strong governance in the coming decades will bring about real change in approaches to the key challenges facing Ireland. There are difficult choices and decisions to be made at every level. How Ireland organises itself at local, regional, national and international level will be extremely important in the future. The development of effective regional governance will be an important part of Ireland's economic success out to 2025.

2.8 Energy Supply and Security

Increasing global energy demand with increased energy prices

Global energy demand is set to continue to grow strongly over the next two decades. Energy prices will be much higher in real terms, making alternative energy technologies and approaches more cost effective. Higher energy costs and tighter environmental regulations will spur innovation in environmental technologies, in which Ireland could participate and from which we could benefit greatly. Energy efficiency and energy conservation, driven by the need to reduce greenhouse gas emissions, are already important issues for policy.

Ireland is highly fossil fuel dependent and import dependent

Ireland is now the most oil dependent economy in the EU. Greater rates of car ownership and increases in car engine size have added to Irish demand for oil. Ireland is also one of the countries most dependent on fossil fuels such as coal, gas and oil for electricity generation. Fossil fuel availability will continue to diminish in the future, given the estimates on the timing of peak oil. These range from five to 30 years, with most experts predicting the onset to occur before 2025.

Need to diversify fuel mix and sustain cost competitiveness

The key energy challenges include how efficiently we can respond in promoting and investing in renewable energy and sustaining cost competitiveness. Efficient investment in energy infrastructure will be crucial over the next two decades. Ireland's energy infrastructure will require significant upgrading if it is to meet future energy demand. It will need to have the ability to integrate a range of options into the energy portfolio mix as well as provide for the electrification of private and public transport.

2.9 Climate Change

Responding to climate change is one of the biggest global challenges

Responding to climate change is one of the biggest challenges facing the world. Delay in taking action on climate change will lead to ultimately higher mitigation costs. The international response to climate change is well advanced and will become even more regulated in the future. The "polluter pays" principle will be incorporated into more actions, be it in terms of electricity, transport, heating etc. Extremely demanding reductions of greenhouse gas (GHG) emissions have been allocated to Ireland, which will require an all-of-government approach and a clear and serious message about change to achieve the 20 per cent reduction target by 2020.

Demanding targets for Ireland

Significant impacts of climate change include access to water, food security, flooding

Foremost among the negative impacts of climate change may be access to water and food security. Precipitation patterns are liable to change as global warming and desertification threatens to reduce arable land in many equatorial regions. Anticipated flooding on the basis of current scientific knowledge could impact large areas of Ireland, and its attendant industry and infrastructure. Significant investment in flood defences to protect communities and critical infrastructures are likely to be required, as will changes in population settlement patterns. The impacts of climate change should therefore be an important focus for policy development into the future.

Role of technology and innovation

Many business opportunities will also arise

The importance of new technologies and innovation to addressing the challenges of climate change is difficult to overstate. Currently available technology, and the technologies expected to be commercialised in the next few decades, could achieve the much needed reductions in GHG emissions.

With an immediate and serious response to climate change, many opportunities will also arise for enterprises in Ireland in the areas of environmental and energy related goods and services.

2.10 Natural Resources

Prudent use of natural resources

The prudent use and protection of domestic natural resources will be increasingly important. The challenge for policy makers is both to meet the demands of a robust, growing economy and to ensure availability of vital resources for the future. Governance is critical to this task, on all levels. Environmental policies need to weigh carefully the uncertainties of the future, especially with regard to energy supply and security and the accompanying social impacts, not just in Ireland but worldwide. With these challenges also come opportunities for enterprise.

Organic farming on the rise …. More demanding consumers

Organic farming is on the rise and is likely to continue to grow. Consumers are increasingly demanding that retailers provide information on 'food miles' and give assurances on the quality and origin of food. Ireland has one of the lowest rates of organic farming in EU, at about one per cent of agricultural land compared with an EU average of four per cent.

The ocean as an untapped resource ….

The ocean area is largely an untapped resource. Ireland's landmass is not just the approximately 84,000 km sq of the island. It also includes an underwater seabed of ten times the island's area, approximately 865,000 km sq. A strategic objective of the Government is to maximise the area of the Continental Shelf under Irish jurisdiction and to establish and delineate its outer limits beyond 200 nautical miles. This would secure access to natural resources, by giving exclusive sovereignty to explore and exploit the seabed up to 500 nautical miles from shore.

Mining for zinc and lead will become more costly...

Ireland has 40 per cent of Europe's zinc and 20 per cent of lead deposits respectively. However, mining will become increasingly difficult and costly as EU environmental directives such as the Mining and Quarrying Directive and the proposed Soil Directive, come into force.

Increasing public interest in biodiversity and nature

There is an increasing public interest in biodiversity and nature. At present the total area of land in Ireland designated for protection under wildlife legislation is approximately 11 per cent of the total. The protection of sufficient land area is required if Ireland is to prevent further loss of biodiversity and ensure the recovery of endangered species.

2.11 Conflict

Increasing global prosperity with conflict and division

Conflict on political, economic and religious grounds remains across the globe, particularly in the Middle East and Africa, and the democratic model is under continuous pressure in many parts of the world.

Cultural issues and religious belief will grow in influence

In many countries particularly outside Western Europe politics is increasingly focusing on cultural issues including religious belief. By 2025 the number of Christians in the world is projected to increase from 2.2 billion in 2005 to 2.7 billion. The Muslim population is projected to grow from 1.4 billion to 1.9 billion and the number of Hindus from 0.9 billion to 1.1 billion. Religious traditions are likely to have a growing influence on constitutional issues in many developing countries and impact on social and ethical issues such as cloning and environmental protection in developed economies.

Increasing global prosperity is likely to continue to be accompanied by the prospect of conflict and division. Access and ownership of scarce resources, particularly in developing countries are likely to acerbate conflict. Among developed economies, the prospects remain positive for progressive multilateral engagements to address global challenges and pursue national interests. The re-emergence of multi-polar power points in the US, EU, ASEAN, Middle East and BRIC countries could serve to increase the importance of such multilateral engagements over the longer-term.

Ireland as a leader for peace and stability

To play a role in reducing international conflict in the future, Ireland will need to present a strong moral basis for leadership. By continuing to address national issues, such as the widening social divide within its own borders, tackling the issues of immigration and racism, sustaining peace on the island of Ireland, and increasing good governance in regional and spatial planning, Ireland can provide support and in some cases leadership in the resolution of conflict internationally.

3. Over-arching Principles – what have we learned?

In responding to the key trends and challenges identified, a number of over-arching principles are proposed to guide the formulation of the strategic policy requirements for Ireland as follows:

3.1 Vision and Leadership Are Key

Due to the magnitude and scope of the changes facing Ireland currently and into the future, longer-term vision and leadership will be increasingly required. Enterprise is at the heart of the economic recovery process and the basis for longer-term well-being. Building a competitive, sustainable enterprise sector will provide the future increases in prosperity and employment, making Ireland a better place to work and a better place to live. To ensure that Ireland achieves this vision will require difficult decisions and allocations, with a focus on enterprise needs and competitiveness. True prioritisation will require choices to be made in terms of expenditures and sequencing, and it may have to be accompanied by significant regulatory and institutional change. Even though the changes required are long-term, the work to bring them about has to begin now. Due to the time needed for example, to deliver major infrastructures and services such as new fully integrated public transport systems or to raise the skills levels of those most vulnerable to economic change over the coming decades, planning and implementation needs to start now.

3.2 Complexity and Uncertainty Should Be Managed

The complexity of the world economy in the future will provide a very demanding context in which to make national decisions. Sophisticated responses will need to be timely and multi-faceted, recognising the complex linkages between different policy areas and the wider effects of individual policy instruments. Effective policy making and associated regulation will be critical for future success. The structure of governance itself will have to change over the coming years, including the existing departmental structures and the relation between national and local government. Rethinking the potential for regional decision making, regulatory processes and the effectiveness of the legal system will also be needed.

3.3 Quality of Life Expectations Will Increase

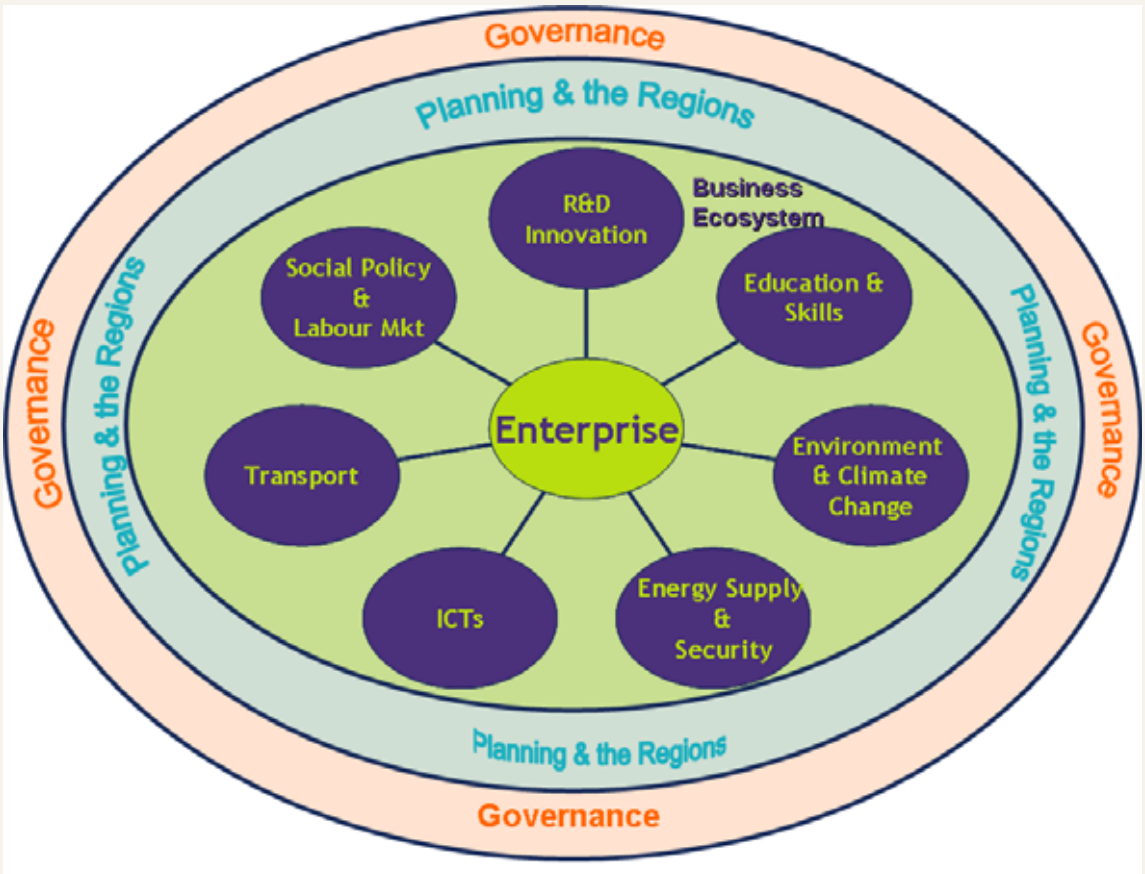
More rapidly changing work and lifestyle patterns, the possibilities of new technologies and the replacement of old communities by new and sometimes virtual ones all point to the future importance of quality of life and well-being issues. This emphasis will be increased by the trends towards longer-life expectancies, as well as the changing attitudes to work, learning and living. The degree to which national structures can accommodate that flexibility and increasing mobility will be a measure of how far the economy is meeting the needs of a changing business world, but it will also be a measure of how far society as a whole is meeting the growing requirements of individuals. Quality of life is and will increasingly be an important factor in competitiveness and a critical performance indicator for the citizen in his or her interaction with government.

4. Strategic Policy Requirements

The enterprise sector will provide the basis for sustainable employment and economic growth over the medium to long-term. Ireland has a number of strengths to underpin future enterprise growth and wealth creation including one of the youngest and best educated populations in Europe, growing levels of innovation and research activity, a pro-enterprise public policy environment that has strongly promoted investment and work, and a modern and highly productive internationally trading enterprise base that is proving relatively resilient during the current downturn. Ireland remains one of the most open economies in the world, attractive for international investment and with a good quality of life for high-skill workers.

These are important strengths that need to be protected and further developed through the key public policy levers available nationally, in the context of the increasing number of policy areas that are being determined at a collective international level. It is those countries that are sufficiently agile and flexible in responding to the current crisis and building the foundations for a strong enterprise base for the future that have the best chances of restoring growth and prosperity.

The assessment of future scenarios and uncertainties has identified a range of policy priorities for Ireland and these are set out below.



The strategic policy requirements span a range of government departments, state agencies and regulatory bodies and will necessitate higher levels of integration in order to develop and maintain a competitive operating environment for enterprises in Ireland. The options presented seek to address a number of challenges that emerged from the scenario building process including:

- Managing the potential conflicts between economic policy, environmental concerns and resource prioritisation issues;
- Connecting policy and decision makers more effectively at different levels from the local to national to global; and,
- Strategically planning our spatial development and prioritising investment decisions and expenditure.

The following sections address these issues and set out the strategic policy requirements for Ireland to build a sustainable and competitive enterprise sector in 2025. They will also support the rebalancing of the economy towards export-led growth and recovery from the dependence on domestic demand and construction of recent years.

4.1 The Enterprise Sector

4.1.1. Longer-Term Enterprise Strategy: Building Ireland's Competitive Advantage

The enterprise sector has performed exceptionally well over the last decade providing unprecedented numbers of jobs and improved incomes for the people of Ireland. It is undergoing a fundamental restructuring, in part driven by the crisis in international financial markets and the global recession, together with consequent changes in the dynamics of global trade, investment and geo-political landscape and changes in Ireland's comparative advantages as a more developed and higher income economy.

In this context there is a need to continually renew policy for enterprise development, incorporating a long-term perspective, and ensuring that current enterprise strategies are appropriate to the future enterprise base. Building on the advantages we have in key areas such as life sciences, ICT services, financial services and food and agribusiness will be as important as building new advantages in biomedical, digital media and cleantech. Ireland is also well positioned to harness the potential from convergence between ICT, bio and nano sciences and the critical importance of engineering as an underpinning discipline in all activities.

Our success in developing a significant presence in areas such as medical technologies, life science manufacturing and financial services and tourism, and more recently as a location for high-end ecommerce and corporate R&D, illustrates the potential for capturing new opportunities of well targeted supportive public interventions in areas such as skills and telecommunications.

Among future priorities are the importance of ensuring adequate quality and supply of key skills and human capital development, infrastructure and telecommunications, and the relevance of a supportive and efficient fiscal environment to productivity and economic growth.

Ireland should aim to be best in class at whatever we do. We need to focus on reinforcing the areas in which we are successful through our approach to education and training.

We also need to be open to the emergence and development of new strengths in response to market opportunities and to continue to develop the agility to move out of sunset areas effectively.

The economy has benefited greatly from an openness to change and an ability to develop appropriate, supportive business environments in which new areas of enterprise can flourish and successfully compete from Ireland on world markets. The country has been very adept at harnessing the potential for wealth creation in new areas of opportunity, arising for example from changes and discontinuities in business models, technology, regulation, and trade and financial liberalisation. Encouraging and supporting entrepreneurship and innovation in all aspects will be essential to harnessing this potential.

4.1.2. Developing Ireland's International Potential

In the past, Ireland has built much of its success on its role as a gateway to the European Single Market, and in particular has acted as a bridge for FDI from the United States and as a competitive manufacturing and services base for our UK and other European partners. Ireland's language, business practices and supportive policy environment have all played a part in this. Economic success has led also to the development of a variety of services businesses in Ireland including financial and software services, agriculture, food processing and construction that have further potential for internationalisation.

With the emergence of countries such as India and China and the EU accession states as foreign direct investment (FDI) destinations, attracting FDI into Ireland is becoming increasingly competitive. To remain competitive and continue to attract FDI there is a need to actively seek out new and emerging markets and work with emerging global multi-national corporations (MNCs) to explore their future needs and the potential role for Ireland as a partner in their innovation processes and in serving global markets.

There is also a clear need to continue to deepen our links with the US and our main European trading and investment partners. We need to develop long lasting relationships and business contacts with China, India and the Middle East to take advantage of opportunities for efficient sourcing and of their importance as emerging hubs of innovation and future sources of FDI.

4.1.3. Integrating Enterprise Support

The State through providing a supportive policy environment and through the actions of a range of government departments and agencies is an important and active partner in the enterprise development process. This is a dynamic process of interaction and mutual support that takes place against a backdrop of dramatic change in the international environment. Enterprise Ireland (EI) is working with firms whether start-ups or scaling, in traditional and emerging sectors, in helping them improve their productivity, exports and access to finance. IDA Ireland, while continuing to attract investment to Ireland, is also working closely with firms to re-position their Irish operations and increase productivity and competitiveness. In this context it is essential that there is coherence and consistency in the approach and commitment to enterprise development requirements at all levels.

To support and encourage the development of enterprise and entrepreneurship there is a need for continued coherence across the full range of agencies that actively work with them. These agencies, some noted above, include EI, FÁS, IDA Ireland and Science Foundation

Ireland (SFI) together with sector specific bodies that either have an enterprise development remit or impact on the investment decisions of firms. These include Bord Bia, Sustainable Energy Ireland, Fáilte Ireland and sectoral regulatory bodies in areas such as communications, the environment and energy. Each organisation is increasingly dependent on the actions of others to ensure that their client firms' growth objectives can be achieved.

New mechanisms and working arrangements will be increasingly required to ensure that state support for enterprise is optimised and that a pro-competitive enterprise perspective pervades all organisational approaches into the future. For example, public procurement provides a major opportunity for Ireland to advance its highest priority policy goals and to achieve the twin objectives of a R&D driven innovative and competitive economy on the one hand and first-class public services for citizens on the other. Realising this opportunity requires both high-level political commitment and detailed changes of practice within the procurement community.

The Enterprise Sector: Strategic Policy Requirements

- Continue the focus on building competitive advantage in new and emerging high-productivity sectors, underpinned by a longer-term strategy for addressing the needs of a competitive enterprise sector that will support job creation and growth.
- Develop Ireland as an international trade and investment partner for developed economies and high growth countries and regions.
- Create and maintain an integrated approach across the State sector to support enterprise productivity and growth.

4.2 Education and Skills

Accelerating technological change and increasing globalisation heighten the need for an integrated approach to education, training policy, and labour market policy. Ireland has the potential and needs to aspire to achieving educational outcomes that are among the highest in the OECD. Excellent delivery will also be needed, with a high quality education system that is flexible, adaptable and demand driven. It will have to take account of the need for the development of the full range of hard and soft skills. In particular, the flexibility will have to be sufficient to sustain and enhance changing expectations about career paths and work-life balance over longer life spans.

The greater exploitation of ICTs will be needed to make maximum use of national and international resources in education, and to ensure that Ireland continues in the forefront of education training outcomes internationally. Education and upskilling are also key components in the response to the large numbers being made unemployed in the current downturn.

In addition, strategies will have to be developed to support immigrants' longer-term education and skill development needs, and the ability of these strategies to cope with accelerating changes in the scale and the origins of immigration will also be important. The Governments' announcement of the introduction of universal pre-primary education is a significant advance that should improve educational outcomes over the long run.

Strategic Policy Requirements: Education and Skills

- Develop an integrated approach to education and training policy and delivery.
- Raise education outcomes to the top deciles in OECD countries.
- Encourage the development of the softer skills essential for commerce and innovation, as identified in the National Skills Strategy.
- Develop strategies that support immigrants' education and skill development needs, particularly language skills.

4.3 Innovation and Research

As a small open economy, highly dependent on exports for economic growth and prosperity, innovation and creativity are key determinants of success in international markets. Innovation and creativity of products and services are underpinned by the strength of our education and research systems and by the effectiveness of the links between these sectors and the enterprise base. In the changing global economic environment there is a need to develop a long-term national vision and strategy for innovation, enterprise and R&D that builds on the actions in the Government strategy for STI 2006-2013 and *Building Irelands Smart Economy*. It should be based on the shared understanding that the pace of technological change is accelerating, and that national and enterprise resources need to be among the best, including a developed research base, a vibrant skills market, and enterprise-to-enterprise interaction. The policy priority will be to optimise research excellence and to ensure that the associated strategic economic benefits are achieved in practice. This will need to be accompanied by appropriate regulatory systems that support the innovation process while ensuring that public concerns are addressed. More broadly, a truly open innovation system should be developed, with strong international links, cross-fertilisation across sectors and firm types and a dynamic labour market.

Strategic Policy Requirements: Innovation and Research

- Refresh the national strategy for building an innovation-driven economy and enterprise base.
- Optimise research excellence and associated economic impacts to ensure effective use of investment funds.
- Develop the openness of the enterprise sector and the research base to mutual collaboration.
- Incorporate food security and the vulnerability of supply in long-term planning.

4.4 Information and Communication Technologies

With the pervasive growth in information and communications technologies and applications continuing worldwide, Ireland's economic and social development possibilities will depend on key infrastructural and institutional change. Universal access to broadband and next generation networks (NGNs) will be essential in allowing new types of enterprises (in services, in media, in education and in health) to emerge, flourish, and to grow globally. Innovative

financing systems will also be needed to encourage wide-scale access to ICTs, accompanied by clear and effective regulation of electronic communications to encourage competition and to maximise consumer confidence in the use of ICTs. The new technologies have the power to transform the worlds of work, learning and leisure. They will play a crucial role in developing and sustaining social development in Ireland if the full potential of the country is to be realised through comprehensive policy implementation.

Strategic Policy Requirements: Information and Communication Technologies

- Ensure universal access to high speed, reliable, seamless, wireless and hardwired communication capacity to foster innovation and productivity.
- Identify the most efficient and innovative funding systems to encourage wide-scale access to ICTs.
- Provide clear and effective regulation of electronic communications to drive innovation and competitiveness and deliver on consumer interests.
- Ensure the integrity of ICT systems to maximise consumer ICT confidence and use.

4.5 Energy Security and Supply

In the context of the significant energy market and policy developments underway and likely over the coming years, Ireland's future energy policy is one of the key areas where short-term decisions could lead to longer-term competitiveness and sustainability advantages or disadvantages. The energy policy challenge is to determine options and trade-offs for Ireland and to implement the best mix in line with technology and resource trends worldwide. A central element will be the development of a flexible, dynamic and efficient supply-distribution grid system, one that allows inputs from multiple (including small-scale and household) generation sources. Initiatives to achieve energy efficiency and conservation will also be needed on a scale much greater than currently envisaged. A national strategy to prepare for the challenges of peak oil is a particular requirement for Ireland, which is more heavily dependent on imported oil than our European neighbours.

Strategic Policy Requirements: Energy Security and Supply

- Develop an overarching national strategy to prepare for the challenge of peak oil.
- Develop a range of energy options that will ensure diversity and security of supply and sustain national competitiveness.
- Develop a flexible, dynamic and efficient supply-distribution grid system.
- Develop effective measures to achieve energy efficiency and conservation, the crucial elements in ensuring a secure energy supply and reduced GHG emissions.

4.6 Environment and Climate Change

In relation to climate change, the biggest challenge will be to establish a clear public understanding of the need for change and then to change behaviours. While business has begun the adaptation process, the contribution of households and individuals to climate change abatement is just as important. Significant changes in travel and leisure patterns are needed and will not happen unless there is a widespread acceptance of the need for change and the policy changes needed (including investments and incentives) are put in place as part of a long-term all-of-Government strategy. In parallel, comprehensive strategies and plans will be needed to address the problems raised by global warming with climate-proof strategies for regional development and for essential infrastructure. Public services for protection and disaster recovery will have to be expanded. On a more positive note, the growth worldwide of environmental concerns will in turn create growth opportunities for business, with many opportunities for indigenous enterprises and FDI in environmental and energy-related goods and services.

Strategic Policy Requirements: Environment and Climate Change

- Develop a long-term vision and action plan to reduce Ireland's GHG emissions, to mitigate the effects of climate change and sustain national competitiveness.
- Climate proof land-use and spatial strategies, as well as infrastructure investment plans and critical infrastructures.
- Maximise the potential for indigenous and FDI opportunities in environmental and energy goods and services.

4.7 Transport

In light of the energy and environmental concerns already discussed, a fully integrated public transport system for the movement of people and goods will be an essential factor in the future sustainability and competitiveness of the Irish economy.

Building on *Transport 21*, the years after 2016 will require continued prioritisation of investment in transport infrastructure. These transport systems should be based on technologies and control systems more sophisticated than those applied today with significant potential benefits for Irish enterprise and labour market mobility.

There is a need to prepare for greater use of embedded intelligence in transport systems, and to integrate carbon reduction and clean technologies. The new systems, if planned correctly, will minimise costs and contribute to better community development, increased leisure opportunities and improved quality of life. Ireland's international connectivity (sea and air) will also need to be reviewed and revised as the global challenges heighten, while world trade continues to grow with emerging economies and the need for international mobility for business increases.

Strategic Policy Requirements: Transport

- Continue to invest in the development of a fully integrated public transport system that provides efficient, cost-effective and sustainable transport for the movement of people and goods.

- Continue to prioritise major investment in transport infrastructure to 2016 and beyond, and communicate effectively the economic and social benefits to the public.
- Maximise the use of embedded intelligence in transport systems to improve the flow of people, goods and services and to develop world-class logistics solutions.
- Make carbon reduction and the use of clean energy technologies a central principle throughout the transport planning and delivery systems.
- Develop the best possible international linkages from Ireland to key future trading hubs globally.

4.8 Social Policy and Quality of Life

With the broad demographic trends already under way, the cultural changes associated with new technologies and new occupations, and the challenges for the idea of community in the face of new patterns of work and living, it is clear that social policy in a broad sense will have to be formulated and implemented in new ways. In particular, there will have to be a debate on the some fundamental questions including: how can Ireland reconnect to, renew and update its own sense of identity? This will determine the degree to which Irish society reflects a distinctive consensus or is simply a by-product of global trends. It will also determine the authenticity and success of social policy in the future, and the extent to which there is sustained commitment on the part of individuals to the concept and the institutions of the State. Social policy will have to take a consistent whole-of-life approach, recognising the requirements of individuals at different stages and how the relative importance of those requirements may be changing due to economic and cultural factors.

Economic, social and land use policy need to be increasingly mutually reinforcing, so that in future, development is not only a question of trying to avoid the mistakes of the past but also a question of how to maximise the social benefits of investment, in terms of services delivery, community development and better quality of life. In the light of new and different immigration trends, there will also be a need for a long-term strategy on immigration, with a coherent framework for support for immigrants.

Strategic Policy Requirements: Social Policy and Quality of Life

- Initiate debate on how can Ireland best reconnect to, renew and update its own sense of values and identity.
- Further develop a consistent whole-of-life approach to social policy.
- Integrate economic, social and land use policies around the needs of individuals.
- Develop a clear, national, agreed long-term strategy on immigration.
- Develop a coherent framework of support for immigrants.

4.9 Spatial Planning and the Regions

A review of the planning framework and systems is needed to ensure it is fit for purpose in preparing for future challenges. Far-reaching decisions will be required in the context of national and international energy and environmental concerns. The planning framework can also play a more positive role in Ireland's future development, by helping to promote social cohesion and improve quality of life. The review should include the development of a robust regional framework that seeks to build vibrant, sustainable and competitive cities, and to ensure that towns and villages provide individual attractions and advantages that offer a choice of sustainable lifestyles with thriving communities. Part of this task should be the development of a new all-island spatial strategy.

Strategic Policy Requirements: Planning and the Regions

- Develop and implement a new all-island spatial strategy.
- Review and strengthen the planning framework and systems to achieve a coherent and rigorous strategic planning regime.
- Create a clear and robust regional framework to ensure all regions achieve their potential and that we build vibrant, sustainable and competitive cities.

4.10 Governance

To respond in an integrated manner to the significant challenges emerging, changes to governance will be needed in the future. In the first instance a review should be undertaken of current governance structures and the nature of executive power at each level of public administration in Ireland. It should build on the 'lifecycle' approach in *Towards 2016* by reviewing policies and institutions for their impact on and interactions with different age groups and with individuals in different social groups. This review should take account of the need for new or revitalised value systems, and the importance of good governance systems in encouraging and strengthening the links within society as a whole.

In the face of the major external challenges now being experienced there is a need for a longer-term framework for investment prioritisation and for sustainability of public finances. A well-constructed and accessible governance system will further support the development of national consensus on the difficult choices to be made.

Strategic Policy Requirements: Governance

- Review current governance structures and the nature of executive power at each level of public administration in Ireland to ensure we have the capacity to plan strategically and invest in a cohesive and efficient manner for the future.
- Develop a new value system for public governance and decision making, building on the 'lifecycle' approach to public policy set out in *Towards 2016*.
- Develop a long-term framework for investment prioritisation and the sustainability of public finances.

5. Conclusions

The forces of change, the global trends and the potential scenarios that determine Ireland's future are already underway.

In response, this report has brought forward a set of strategic policy requirements intended to be robust enough to ensure that Ireland makes the most of the opportunities that will arise, while countering the major threats.

While the strategic policy requirements are not recommendations as such, we believe they are well-founded because they relate to critically important areas for the future and consideration of the issues and responses need to begin as soon as possible.

When considering these policy areas and requirements, there is a need to take into account the resources available, including exchequer funds, and to prioritise accordingly. Notwithstanding current difficulties, Ireland will need buoyant revenues to support these strategic policy requirements and prioritisation of expenditure will be necessary.

The trends reviewed, consultations completed and the scenarios developed in the preparation of this report highlight the range of areas in which policy decisions will have a substantive impact on future enterprise development, jobs, incomes, growth and ultimately on future national prosperity.

Overall, three areas for priority focus are proposed to give effect to the recommendations set out above:

- The first is to place sufficient emphasis on long-term thinking into today's policy analysis, decision making and implementation in relation to economic and social development, public finances and energy and environmental policy;
- The second is to develop our institutional capacity to anticipate and prepare for future challenges, trends and opportunities in a systematic way. Established methods for forward-looking integrated assessments such as horizon scanning, should be structurally incorporated into all government departments. A centre of excellence or public sector observatory of national and international trends and developments would be of benefit, with the role of supporting departmental activities and policy deliberations;
- The third is the increased need for relevant areas of the public sector to work more cohesively and collaboratively in policy formulation and implementation on the major cross-cutting priorities in areas such as competitiveness and enterprise development, labour market developments, climate change and energy policy, social inclusion and cohesion and well-being.

With the right policies, Ireland can successfully continue to transform the enterprise base to one with a self-sustaining dynamic of innovation and growth in high-productivity sectors, which is providing well-paid and fulfilling employment and which can compete and win in world markets. The longer-term competitiveness, including cost competitiveness, of the business environment in Ireland across the areas outlined in this report will provide the essential platform for underpinning this transformation.

Ireland has demonstrated vision and leadership in the past. We have shown a capacity to take a longer-term perspective, to prioritise and to invest for the future in key areas such as education and research, transport and infrastructure and in making pension provisions for an ageing population. As the pace of change accelerates and policy formulation and delivery increases in complexity such vision and leadership is even more important. We must demonstrate it again.

1. The Need for Long-Term Policy Development

This section provides a brief background and rationale for the report, outlines the need for long-term policy development and discusses the project objectives and methodology.

Ireland is a small country, geographically isolated and limited in natural resources. It is one of the most open economies in the world and therefore vulnerable to sudden change in the global economy. Counterbalancing this vulnerability is a nation with a flexible, outward-looking high-income economy, a young, skilled and educated work force and a considerable ability to plan and to provide for changes in the world. Ireland can and does take advantage of its positive attributes.

Strong responses have been necessary to meet the challenges of the global economic turmoil of 2008/9 and to focus on responding to the external competitive environment. We also have to address deficiencies in framework conditions within a medium timeframe. But as well as this, Ireland needs also to take into account the potential impact of long-term developments, especially those involving significant change or discontinuities in the external environment and to ensure that appropriate long-term strategies to respond are in place.

Preparation for long-term change needs to begin early, through initiating the necessary investment and regulatory change. A first step in this is to analyse the potential scope, scale and speed of possible changes in the future and the impacts that they may have on the world and the country in which we live.

The scope of change may be difficult to grasp. And its pace, was once slow and its effects predictable. Now, change has never been so rapid and so often radical and uncertain. To remain economically competitive in the fast changing global environment, Ireland therefore needs to examine and prepare for what may come.

1.1 Looking to the Future

While we cannot predict the future, we must plan for it. The decisions that we take today will shape, inform, enable and restrict our options in the future. And the longer the timeframe of those decisions, the greater the uncertainty, and the greater the need for well-considered and strategic actions.

With increased uncertainty comes an ever greater responsibility to look at the wider context within which policy decisions play out, so that we envisage a range of possible futures and do not construct a future fit only for the past. We need to achieve a balanced combination of long-term decisions that are as informed as possible with the resulting strategies as robust as possible, and an implementation framework that is as flexible as possible.

1.2 Key Themes

In 1996 Forfás published the *Shaping Our Future* report on industrial policy. It looked forward 15 years and set out how the enterprise sector could evolve with the right policy conditions in place. It took, what was for the time, a comprehensive view of the framework conditions for enterprise, looking at taxation, technology, trade, regional policy, emerging sectors, and the role of direct support to enterprise.

The present study, *Sharing Our Future,* also looks forward 15 years. Thematically and in its title there is some acknowledgement of the earlier work. This is because the broad approach to enterprise policy adopted 15 years ago is still necessary. If anything, an even broader approach is required since in the ensuing years the range of relevant policy issues has widened. Consider how, for example, energy and environmental issues have moved to the centre of policy debate in recent times. Consider also the degree to which events outside our shores affect Ireland has increased, and how more geographically distant areas of the world now have far more importance for us than they once did.

This report acknowledges 'sharing' as a new and significant theme for the years to come. Firstly in the global sense: more and more, as the current financial crisis graphically demonstrates Ireland's economy shares links with the world economy as a whole. Ireland will have to find its place in an increasingly competitive world where large nations, sometimes rich in resources, are determined to increase their living standards and influence. Also, at a global level the magnitude and urgency of energy and environmental issues are such that only shared agreement and common implementation between countries offers any real solutions. Ireland will have to assume and share new responsibilities along with other nations as the climate crisis intensifies.

Secondly, and from an internal perspective, there is a new emphasis on 'sharing' within Ireland addressing inequalities in incomes and opportunities: the need for solutions to the pressures of environmental concerns, the changed nature of North-South relations, and the growing importance of quality of life issues in terms of competitiveness and, more importantly, as critical determinants of social stability. Indeed the new composition of Ireland's population requires changes in attitudes and shared solutions at all levels and between all the different groups involved.

1.3 Futures Research

This Forfás project has employed futures research methodology incorporating scenario planning to examine the range of possibilities and uncertainties that will shape the world in 2025. Futures research encompasses a number of proven strategic tools and techniques developed over many years. A growing number of commercial organisations, national and local governments, international bodies and local non-governmental organisations (NGOs) use scenario planning, horizon scanning, trend extrapolation, cross-impact analysis, Delphi methods and many other futures tools to be more competitive, more prepared and more informed.

The futures research approach was selected to provide Forfás and the wider policy community with a foundation to articulate:

- Long-term thinking about likely future trends and conditions and their implications for the Irish economy;
- Possible policy changes that need to take place now to address challenges that may lie ahead in the future; and
- Coherent, robust, and strategic, longer-term strategic policy requirements for enterprise development in Ireland.

The research methodology included a wide consultation exercise with senior figures from national and international organisations to gather their views about the key forces, issues and trends in shaping the world and Ireland in 2025. A series of workshops and a total of 11 focus groups and 11 expert interviews were also completed. The *Sharing Our Future* study also involved a scenario planning process, a number of creative exercises and a review of a large number of futures-related studies and articles on technologies, economies, regions and sectors.

Futures Research

- The future is determined by a combination of factors, not least of which is human choice. What we decide today will have a significant effect tomorrow.
- There are alternative futures. There is always a range of decision and planning choices. We must seek out and determine these choices and select the best possible alternative.
- We operate within an interdependent, interrelated system. Any major decision, development, or force that affects any part of the system is likely to affect the entire system. We must be aware of changes not only in our own areas but in other areas within the system.
- Tomorrow's problems are developing today. Minor problems ignored today may have catastrophic consequences five years from now. Gradual changes or distinct trends and developments cannot be ignored. We cannot allow ourselves to become preoccupied with immediate concerns. The near future must be an integral part of current decision making.
- We should regularly develop possible responses to potential changes. We should monitor trends and developments and not hesitate to use the collective creativity and judgment of our staff to develop forecasts, projections, and predictions.

Frederick R. Brodzinski, The Futurist Perspective and the Managerial Process

1.4 Project Objectives

The **central strategic question** that guided the work was as follows:

In the context of broader societal goals such as prosperity and full employment, social justice and equity, security, liberty and well being,

What decisions should be made to ensure a sustainable, competitive enterprise sector in 2025 and in 2040?

The outputs from the project are three-fold:

- Firstly, identification of the major forces of change that will shape the world in which Ireland operates in 2025;
- Secondly, the development of a cluster of key crosscutting messages and overarching principles arising from the scenario planning process. Combined with the forces of change identified, these act as a foundation for understanding future global and Irish directions and as a stimulus for strategic thinking, development and action for the policy community; and
- Thirdly, the development of a set of key policy priority areas and strategic policy requirements for enterprise development in Ireland.

2. The Forces of Change to 2025

This section focuses on the nature of the influences, pressures and issues underlying the challenges the country faces to 2025. It details a number of consultation and research-based quantitative analyses and projections for Ireland, comprehensively describing the forces that will shape the world, the economy, the nation and consequently the policy environment in the decades to come.

In identifying the forces of change in which Ireland as a country and an economy will operate in the future, the *Sharing Our Future* project reviewed a wide range of futures related studies and reports and carried out an extensive consultation exercise with national and international organisations, leading industry associations, investors, and consumers and NGOs. This process delineated over 30 forces of change, issues and uncertainties encompassing developments in technologies, the environment and society within a national and global economic context. The cross-cutting elements and common themes were then distilled into 11 key areas as follows:

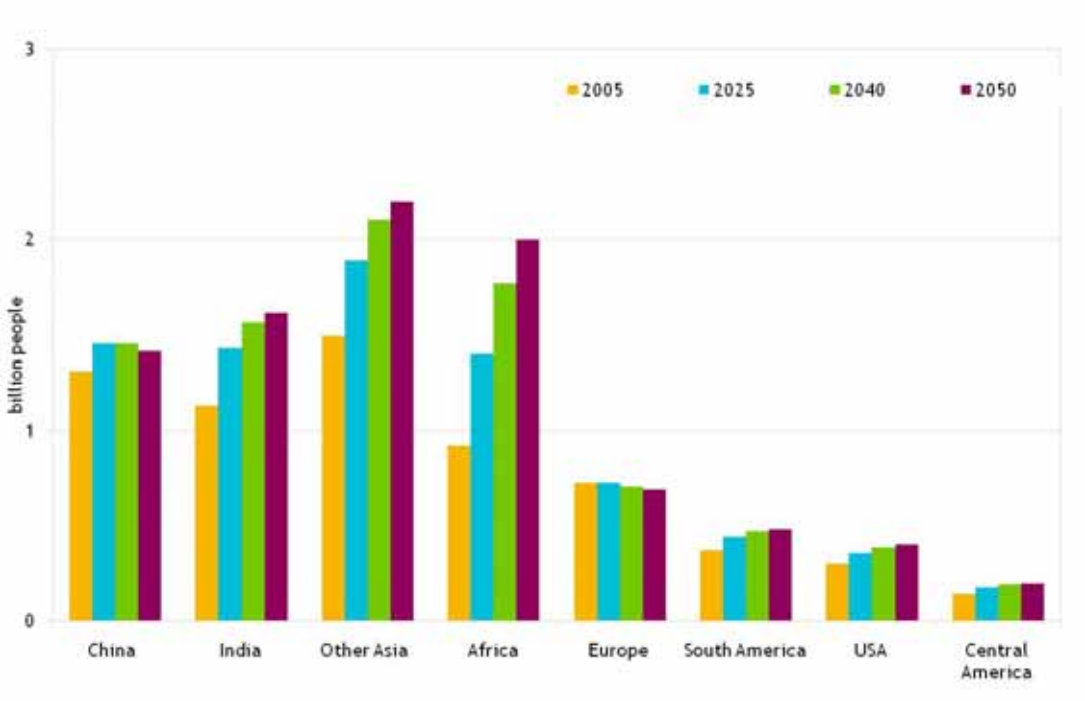
- Demographics
- Technology, Innovation and Entrepreneurship
- Education and Skills
- Social Values and Quality of Life
- Globalisation
- Infrastructure
- Governance and Regulation
- Energy Supply and Security
- Climate Change
- Natural Resources
- Conflict

The discussion below describes and examines the forces of change that will shape the world to 2025: some of which Ireland will be able to influence or control, others of which it will not.

2.1 Demographics

Demographic change in Ireland and globally is one of the biggest challenges facing Ireland into the future. At world level, the United Nations (UN) projects a world population increase from 6.6 billion in 2005 to 9.2 billion by 2050. Asia will account for half of the 2.6 billion population growth (India +0.5 billion, China +0.096 billion and other Asian countries +0.7 billion). Africa will account for a further 40 per cent of growth (+1.1 billion) and the remainder will come primarily in the Americas. Europe's population is forecast to fall by almost 10 per cent by 2050, from 731 million in 2005 to 664 million, as illustrated in Figure 1.

Figure 1: Projected World Population by Major Region, 2005 and 2050[1]



Source: UN Population Database (medium variant)

Ireland's population in 2008 was estimated at 4.42 million, an increase of 22 per cent from 3.63 million in 1996. Continued population growth over the coming decades through maintenance of recent high fertility rates and continued net inward migration could see the population of the State grow up to 5.5 million by 2025 and between 5.0 and 7.0 million by 2041[2,3], up to a 61 per cent increase on the 2007 population. These figures are highly dependent on the levels of net migration over the medium to long-term which will no doubt be impacted by the current economic downturn[4]. With further EU enlargement and the free movement of workers by 2014, immigration rates could again increase over the medium to long term, as illustrated in Figure 2, the implications of which need to be carefully considered.

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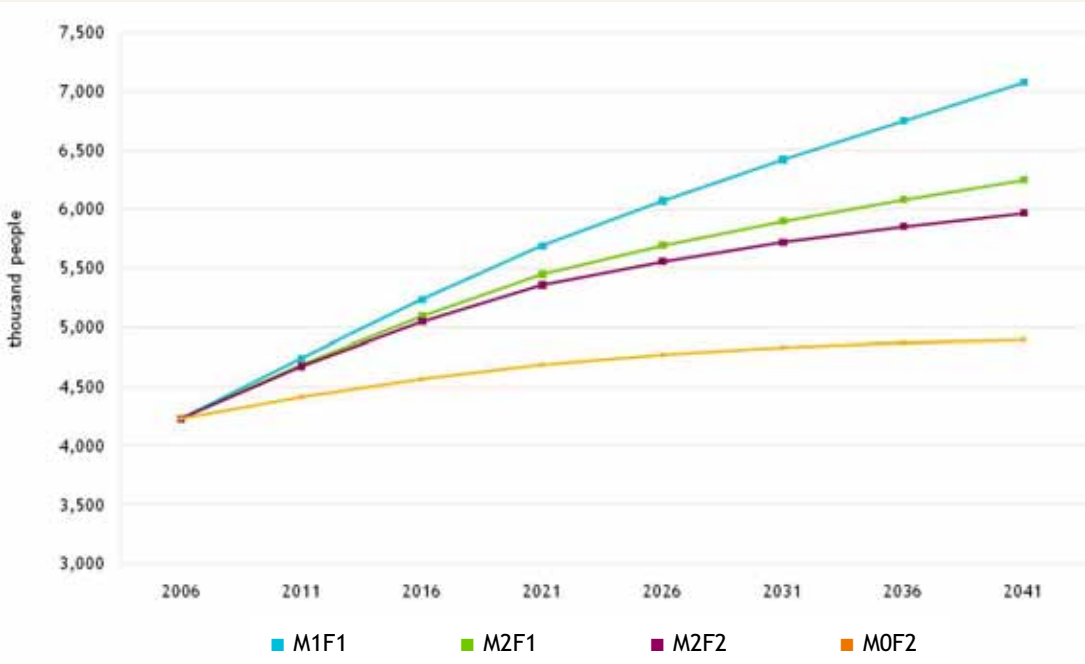
1 Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2007 Revision. *http://esa.un.org/unup*

2 Green Paper on Pensions, Department of Social and Family Affairs, October 2007.

3 CSO 2004 population projections updated for 2006 Census data (M1F1 high migration and high fertility assumptions to 2040).

4 Depending on what CSO model is used the forecasted population of the State ranges between 4.9 million and 7.07 million in 2041.

Figure 2: Ireland Population Projections, 2006-2041



Source: CSO[5]

The age structure of the Irish population is younger than most other countries in the EU and this will not begin to change significantly until 2016.Ireland currently has a population bulge in the 25-44 cohort, accounting for 1.343 million, or 32 per cent of the population[6]. Ireland's peak population age group is about 10-15 years younger than the EU average. After 2016 Ireland's population age profile will begin to increase, with those aged 65+ accounting for 20-25 per cent of the population by 2040. This will be up from 11 per cent from 2008 as Ireland's population structure converges to that of the rest of Europe. The older population (aged 65 and over) is projected to increase very significantly from its 2006 levels. The very old population (aged 80 and over) is set to rise even more dramatically from the 2001 level resulting in more older persons than younger persons.

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5 Assumptions

Fertility

F1: Total Fertility Rate to remain at its 2006 level of 1.9 for the lifetime of the projections

F2: Total Fertility Rate to decrease to 1.65 by 2016 and to remain constant thereafter

Migration:

MO is immigration at very low levels

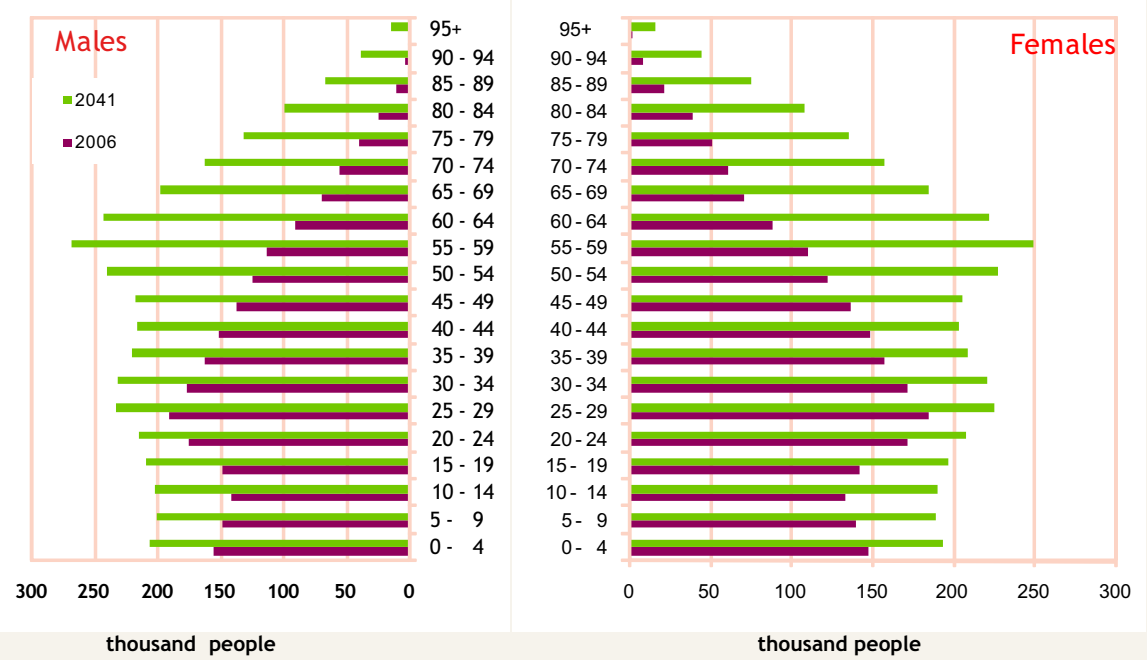
M1 is immigration continuing at a high level and then moderating

M2 is immigration continuing at more moderate levels

6 Population and Labour Force Projections 2011-2041, CSO 2008.

The changing population structure is best illustrated by comparing 'population pyramids' for 2006 and 2041. Figure 3 shows the major expansion projected in the number of persons aged 50 and over, based on a scenario of continued high fertility and inward migration rates. While fertility and migration rates may slow in the short-term, it is important for effective policy planning to consider potential implications should growth resume. Life expectancy is also expected to continue to increase over the long term and be in the low to mid-80s years of age for both males and females.

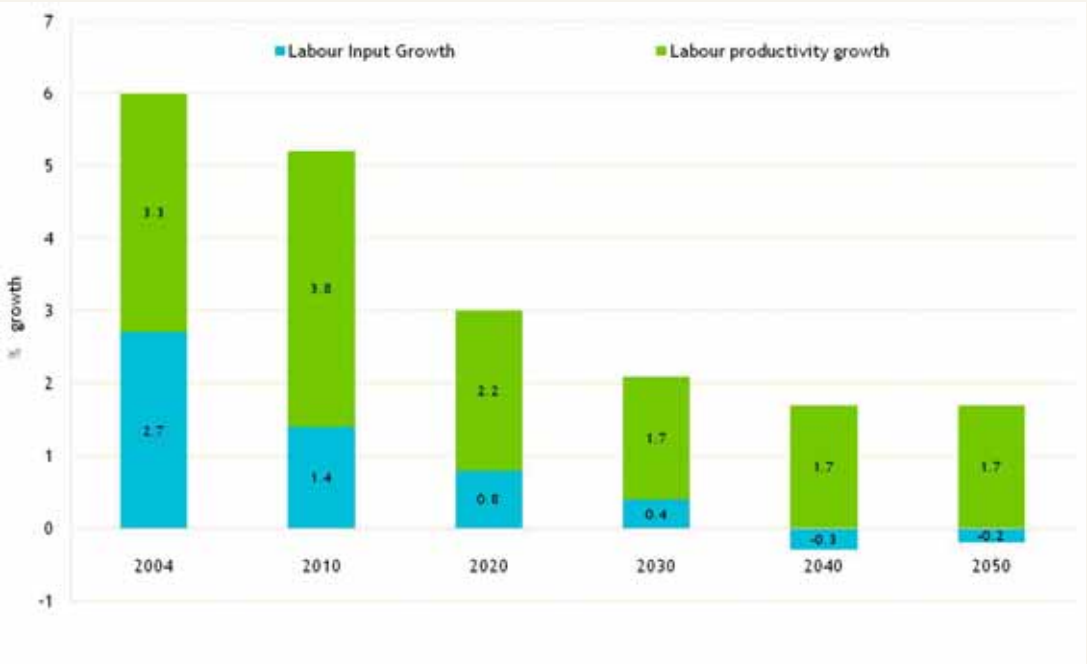
Figure 3: Ireland's Projected Population Structure, 2006 and 2041, (CSO M1F1)



Source: CSO Statistics

These changes in population will influence a number of key policy challenges, including a decline in labour force growth and a greater reliance on productivity growth to drive overall economic growth. This will increase demands on the public finances for age-related expenditure in areas of pensions and healthcare and importantly from a spatial dimension, decisions about where people will live, work and play in Ireland over the coming decades. Ireland's labour force in absolute terms is projected to continue to grow modestly up to about 2040 and to start to decline thereafter as the population ages. The growth in Ireland's labour force and increases in participation rates have been significant contributors to Ireland's economic growth over the recent decades. Combined with strong productivity growth rates as Ireland benefited greatly from inflows in investment and new technologies, the country was able to catch up with more advanced economies. However, the European Commission forecasts that much of our future growth will need to come from increases in productivity as the decrease in the numbers at work acts as a drag on overall economic growth. The European Commission projects Irish productivity growth to remain above two per cent for the next two decades and thereafter to converge towards the EU average of around 1.7 per cent per annum from about 2030 onwards, as illustrated in Figure 4.

Figure 4: Contributions to Ireland's GDP Growth Potential to 2050



Source: European Commission, Ageing Working Group, Macroeconomic Assumptions, 2006

The most recent projections by the Central Statistics Office (CSO) for labour force growth over the period to 2021 range from 0.6 per cent - in the absence of migration and a dependence on indigenous supply – to two per cent per annum in a scenario of a continuation of the high economic in-migration flows experienced over recent years. This would indicate that the projections used by the European Commission, as illustrated in Figure 4, would tend to underestimate the potential growth of the economy into the future and that there is potential to achieve trend GDP growth of between four-five per cent over the medium term, albeit highly dependent on net inward migration. Planning for such levels of migration would need to commence now.

Population ageing in the EU will also have a significant impact on economic growth and will lead to significant pressures to increase public spending. The population of the EU is expected to be slightly smaller but much older in 2050. The key change from an economic perspective is the drop in the working age population of 16 per cent while the proportion aged over 65 is projected to increase by 77 per cent. The old age dependency ratio in the EU is projected to halve from four to only two persons of working age for every elderly citizen over 65. Coupled with further increases in life expectancy this will place further pressure on public spending. Keeping people working longer is an option for all countries, as by 2050 the UN projects that the world will have more older people than children. Nearly a third of developed economies' populations will be aged 50 and over. Raising retirement ages and removing age discrimination laws will be among the policy priorities.

As the population grows older, age-related public expenditure in areas such as pensions, health and long-term care will begin to rise and Ireland's changing demographics will have a significant impact on total dependency ratios[7]. Analysis for the 2007 pensions Green Paper indicates that old age dependency ratios in Ireland could increase from around 6:1 in 2005 towards 2:1 by 2050. People will draw pensions for a much longer time than in the past, and those working in the economy will have more and more pensioners to support.

In the absence of policy change the European Commission had estimated that the debt-GDP ratio for the EU as a whole will remain above 60 per cent to 2020 (the Maastricht Treaty guideline) and would rise to 200 per cent of the EU's GDP by 2050[8]. These figures will be subject to revision as the full impact of the recent economic crisis becomes clear.

In an EU context, the pensions challenge is being approached using a number of basic principles, including supporting longer working lives and active ageing, balancing contributions and benefits in an appropriate and socially fair manner, and promoting the affordability and the security of funded and private schemes.

Through the annual allocations to the National Pensions Reserve Fund (NPRF) Ireland is perhaps better placed than most other EU countries in taking measures to ease the future pension burden and maintain budgetary stability. The NPRF had assets of €21 billion in 2007 decreasing to €16.4 billion in 2008[9]. (In line with the 2008 EBR, the National Debt increased by €13 billion and now stands at €50.7 billion. The National Debt/GNP ratio increased from 23.3 per cent at end 2007 to 32.5 per cent at end 2008). As of the 31st March 2009, the funds value stood at €15.5 billion. However, while provision is being made for future pension liabilities, an ageing population will also place increasing demands in other areas of public expenditure including health and long-term care, although there may be some expenditure reductions on education and employment benefits, as illustrated in Figure 5.

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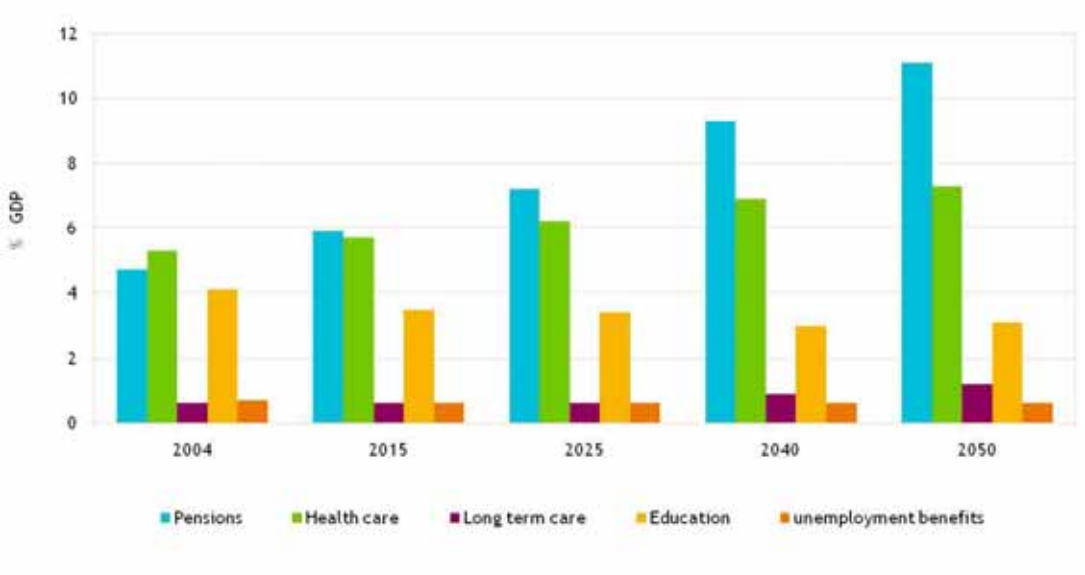
7 A measure of the portion of a population which is composed of dependents (people who are too young or too old to work).

8 European Commission (2006), 'The Long-term Sustainability of Public Finances in the European Union', *European Economy*, No 4/2006.

9 National Treasury Management Agency, January 2009.

Figure 5: Changes in Ireland's Age Related Public Expenditure, 2004-2050



Source: EC Ageing Working Group, 2006

Ireland has a longer timeframe than most to prepare for the coming age-related challenge. But the Department of Finance and the European Commission estimate that the increase in public spending we are set to experience on pensions, health and long-term care will be from around 12 per cent of GDP (14 per cent of GNP) today to between 20 and 26 per cent of GDP by 2050[10,11]. The magnitude of the projected increase in age related spending is such that Ireland is considered to be at 'medium risk' when it comes to long-term sustainability of public finances. The European Commission has concluded that Ireland will have to spend an additional 8.9 percentage points of GDP out to 2060 to cope with the long-term costs of population ageing[12]. This would imply a reduction in spending elsewhere or increases in taxation, with implications for the growth potential of the economy. The 2007 Government Green Paper on Pensions sets out a number of options for Ireland to address this issue.

A growing population, of potentially five to seven million in the State by 2040, gives rise to many challenges. Where will people live, work and play over the coming decades and what quality of life can people expect for the future? While population densities in Ireland are currently among the lowest in developed economies, current projections are for continued strong population growth. Were that growth to occur in an unplanned way in terms of spatial distribution, it would result in significant economic and social costs for the country.

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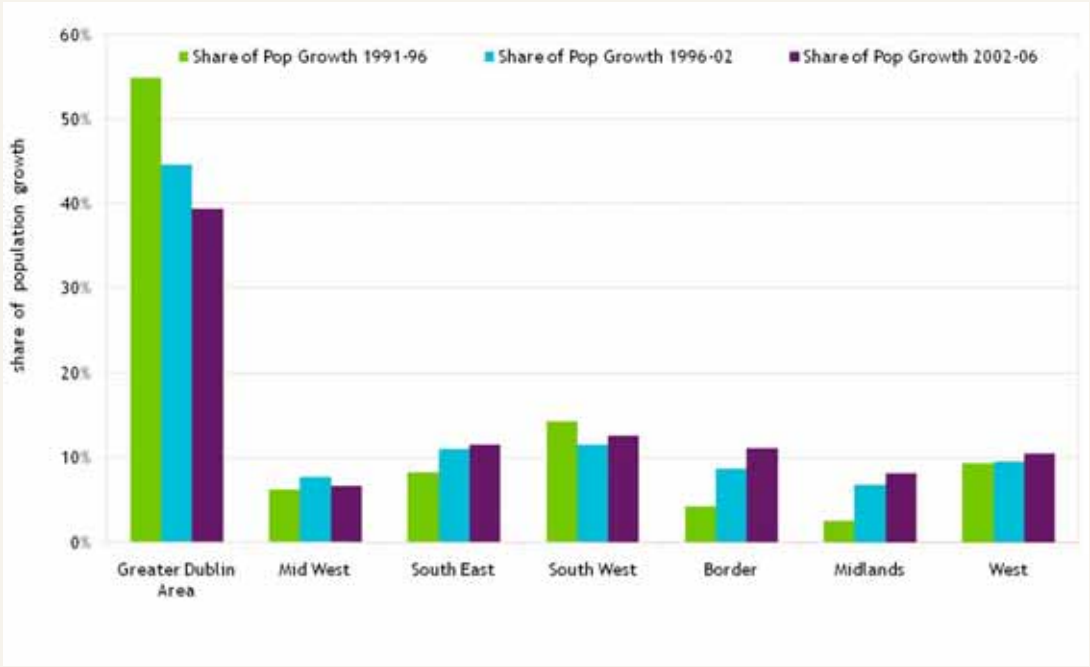
10 Economic Policy Committee & European Commission (2006): The impacts of ageing on public expenditure: projections for the EU 25 Member States on pensions, healthcare, long-term care, education and unemployment transfer.

11 Green Paper on Pensions, Government of Ireland, 2007.

12 European Commission (2009), The 2009 Ageing Report – Economic and Budgetary Projections for the EU-27 Member States (2008-2060).

During the early 1990s, the Greater Dublin Area (GDA), which includes counties Meath, Wicklow and Kildare, accounted for almost three-fifths of population growth, giving rise to significant strains on installed infrastructures, from energy to transport and housing. Over more recent years, the GDA's share of population growth reduced to two-fifths from 2002-2006, with counties around our major cities and in the west experiencing strong rates of population growth, as illustrated in Figure 6. By province, between 2002-2006 the population of Leinster increased by 9.0 per cent compared with 8.6 per cent for Connaught, 8.3 per cent for Ulster (Cavan, Donegal and Monaghan) and 6.6 per cent for Munster. The national average was 8.2 per cent.

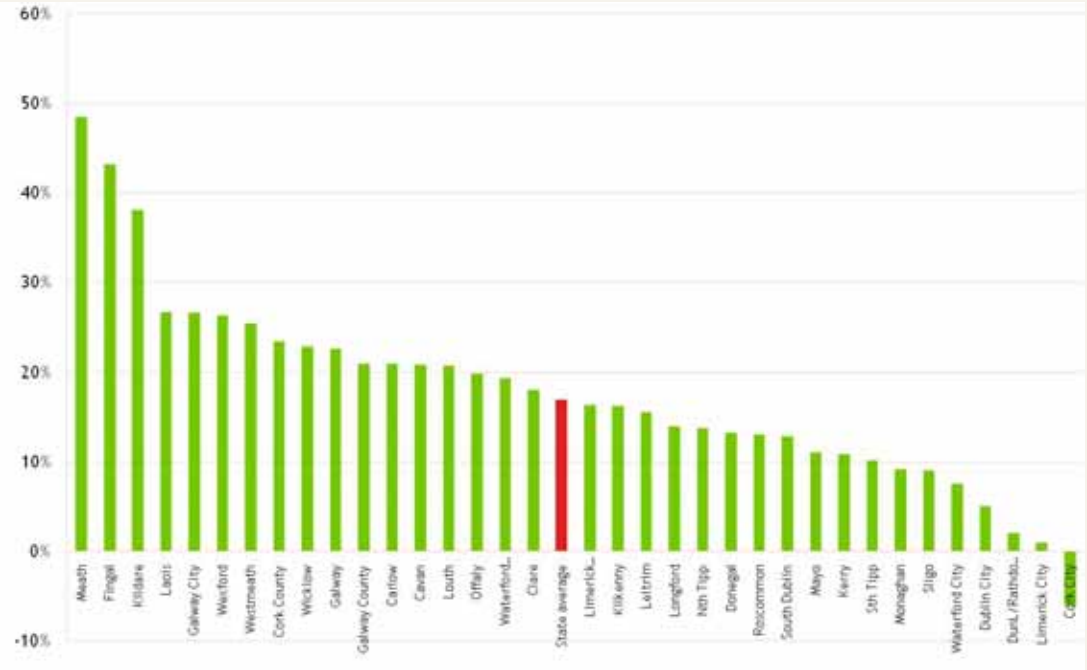
Figure 6: Regional Distribution of Population Growth, 1991-2006



Source: CSO Census, various

This may indicate some success in developing the capacities of the regions as attractive alternative centres for economic activity and for population growth under the 1994-1999 National Development Plan (NDP) and successor NDPs and through the signalling of priorities for investment under the National Spatial Strategy (NSS). However, some of the growth in the Border and Midlands can be attributed to the growing reach of Dublin into counties such as Louth, Laois and Offaly. At the same time, counties Cavan, Leitrim and Donegal have each recorded strong population growth over the last decade, as illustrated in Figure 7.

Figure 7: Population Change (%) by Area, 1996-2006

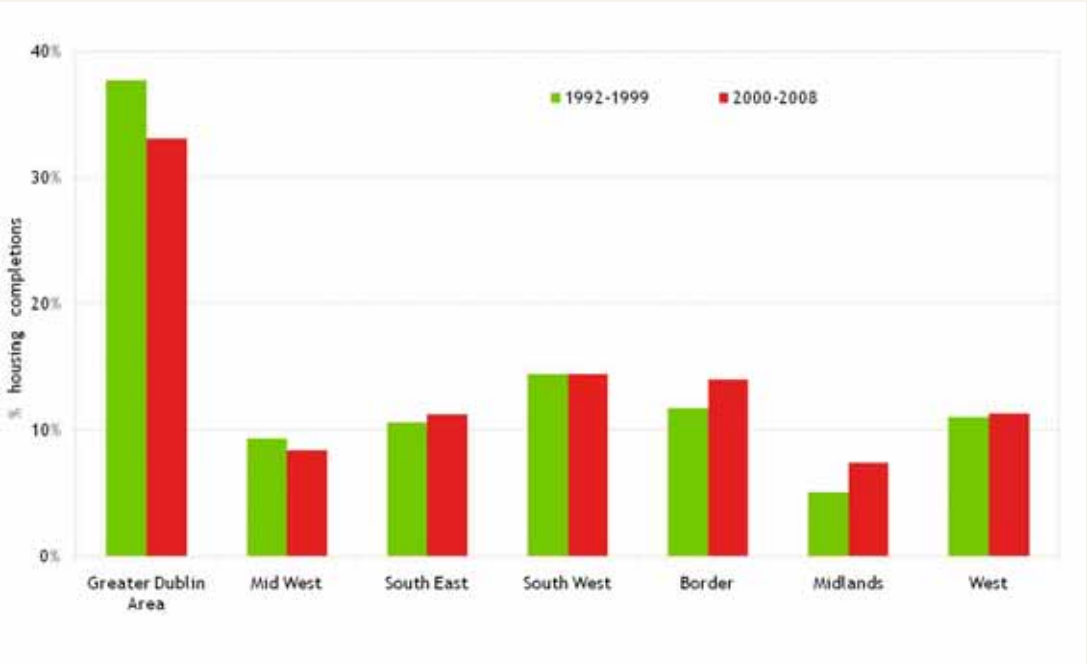


Source: CSO Census various

The trend in regional population growth and a shift from Dublin is also reflected in new housing completions, as illustrated in Figure 8. The GDA's share of new homes declined from 38 per cent in the 1990s to 33 per cent in the 2000s, at a time when the average of new houses built annually doubled (from 32,800 between 1992 and 1999 to 67,734 between 2000 and 2008). This level of activity is reducing. Figures for 2008 show that 51,724 houses were completed, best estimates for 2009 are indicating house completions of 35,000. It is also notable that our cities are not growing in population to the same extent as their surrounding hinterlands and counties, despite the essential role of cities in economic and social development internationally and the importance of cities in the international market for attracting and retaining talent. In 2007, more than half of the world's population lived in cities, and most of these were in cities of less than 500,000 people[13].

13 'Cities and Competitiveness', National Competitiveness Council, May 2009.

Figure 8: Regional Distribution of New House Completions, 1992-2008



Source: DoELG Housing Statistics

While the population of Galway city grew by a quarter from 1996-2006, the cities of Limerick, Waterford and Dublin over the same period each recorded only modest population growth and below the national average. The population of Cork city actually declined over the period. This gives rise to issues in relation to the effectiveness of how we are planning for the growth and development of our cities and for the overall efficiency of spatial development.

Summary

The population of the State is forecast to increase by up to 60 per cent to over seven million by 2040. The population of the island could potentially return to pre-famine levels of over nine million by then. Ireland will have a higher proportion of older people and higher dependency ratios. The policy challenges include an increased reliance on productivity growth for overall economic growth, land use and planning, societal development and the sustainability of our public finances. Healthcare and long-term care will also be significant issues into the future. In light of the projected population growth, spatial planning will be crucial in terms of developing our cities and our interconnectedness both internally and internationally.

2.2 Technology, Innovation and Entrepreneurship

The accelerating pace of technology change and application will have an enormous impact on the global economy and Irish society over the period to 2025. Today, the rate of change is constantly increasing over a range of major technologies including information exchange, communication, computing, and other applied sciences. These advances may one day herald the advent of human-like artificial intelligence and unimagined breakthroughs in cognitive

and nanotechnologies. Technology should be viewed as a catalyst or facilitator of themes and trends in the world today and tomorrow, not a trend in itself.

Continued increases in the pace of change from international development are expected in biotechnology, including genomics; nanotechnologies (including nano medicine); space exploration and travel; robotics and artificial intelligence; and developments in ICT such as ehealth and elearning. The pervasive power of ICTs will continue to increase with the potential for inbuilt intelligence in almost every product or building in the future. Increased mobility, enabled by technology, is expected to be an even more integral part of future human society. Expected developments in energy technology will enable greater use of non-polluting energy sources and increased energy efficiency and conservation. In the future, technological progress is likely to bring increases in the quality of life[14].

The scope and pace of technology change will have enormous impacts on the operating environments for businesses and the economy as a whole, influencing the way we work and the way we live, and requiring changing, adaptable and flexible business models. There will be many opportunities for businesses. Table 1 illustrates the range of near and longer-term technology trends and likely future applications of interest and relevance to Ireland.

Table 1: Possible Technology Trends and Future Applications

Technology Type	Areas of Research	Applications
Biotechnology	Genomics	▪ Prevent and cure disease ▪ Pharmaco-genetics ▪ Individual genome sequencing
	Synthetic biology Cloning	▪ Genetic engineering and application-specific organism development
	Biometrics	▪ Security and communication development
	Food	▪ Enhanced nutrition and functional foods
	Biomedical applications	▪ Surgery, health improvements
	Stem cell research	▪ Prevention and treatment of diseases such as Alzheimer's and Cerebral Palsy

14 Jacoby, Henry D, Reilly, John M., McFarland, James R., and Sergey Paltsev, Massachusetts Institute of Technology (2006), *Technology and Technical Change in the MIT EPPA Model*, Energy Economics, Volume 26, Issues 5-6.

	Microbiotics and probiotics	▪ Disease control and treatment

Technology Type	Areas of Research	Applications
Neuroscience	Neuroengineering Neural network research Biochemistry	▪ Increased understanding of diseases, such as autism ▪ Diagnostics of neurological conditions ▪ Advanced therapies and clinical/surgical interventions

Technology Type	Areas of Research	Applications
Nanotechnology	Nanowires	▪ Embedded fabrics which produce energy from usage ▪ Improvement of photovoltaic technology
	Nanomaterials	▪ Various applications from medical to cosmetic
	Nanochips	▪ Improving computer memory, processing
	High resolution medical imaging	▪ Better diagnostics
	Nanotubes and graphene	▪ Faster electronics processing

Technology Type	Areas of Research	Applications
Artificial Intelligence	Natural User Interface (NUI), Ubiquitous computing	▪ Spoken word or non-verbal interaction between user and computer ▪ Human-like interaction
	Artificial biology	▪ Self-healing, self-teaching software
	Semantic webs	▪ Uniting disparate data stores – large business applicability

		▪ Web 3.0 technology enabling
	Robotics	▪ Search and rescue operations
	Artificial neural networks	▪ Routinisation of repetitive tasks
	Speech recognition	▪ Various applications from aids for the blind to personal devices

Technology Type	Areas of Research	Applications
Transport	Space exploration and travel	▪ Space tourism; moon holidays ▪ Privatised space flight
	Nuclear propulsion	▪ Rocket and space transport
	Networked vehicles	▪ Self directing personal vehicles increase safety
	Distributed traffic management; smart transport	▪ Improved safety and road conditions
	Driverless cars	▪ Improved traffic conditions, carbon emissions, safety improvements
	Intelligent buildings, smart metering	▪ Energy and cost savings ▪ Maximising convenience, comfort, and security

Technology Type	Areas of Research	Applications
Energy, Natural Resources	Fuel cells, synthetic fuels and hydrogen	▪ Use of fuel cells, synthetic fuels and hydrogen for powering cities and towns
	Carbon sequestration	▪ Reduced CO_2 emissions and improved production efficiency for cheaper, cleaner energy

	Renewable energy Energy storage – hot slat, compressed air, capacitors	▪ Next generation biofuels, ▪ Waste ▪ Wind ▪ Ocean (current, tidal) ▪ Photovoltaic
	Purification	▪ Large scale use of cheap, mobile technology for solving world's water crisis
	Distributed generation Demand smoothing	▪ Introduction of demand-side mechanisms to reduce costs and improve efficiency
	Third and fourth generation nuclear power reactors (pebble bed technology)	▪ Potential to greatly reduce the amount of radioactive fuel sources needed, as well as reduce nuclear waste and associated disposal costs

Technology Type	Areas of Research	Applications
Communications and Information Technology	Ubiquitous computing NGNs Advanced broadband technologies	▪ Fibre optic advancement improving speed and accessibility ▪ Wireless technology reaching more consumers ▪ Bridging the digital divide
	Virtual worlds	▪ Increasing virtual interaction, enabling elearning and e-medicine ▪ Improving social inclusion ▪ Second-Life and similar virtual experiences
	Real time exchange	▪ High speed video and voice enable remote accessibility for leisure, business, everything in between ▪ Web 2.0 and 3.0 enabled ▪ Telemedicine and elearning

		a reality ▪ Production, inventories, and delivery mechanisms seamlessly integrated
	Cloud computing	▪ Virtualization of servers on a shared super-server
	Computer aided design	▪ Integrating scientific computing in mainstream engineering design ▪ Manufacturing production ▪ In-silico design of drugs and therapies ▪ Designing biological processes

In a number of the areas illustrated the basic and fundamental scientific research is well advanced internationally. In some cases early stage commercial applications are progressing and may give rise to opportunities for enterprise and wealth creation in Ireland. As an example, Ireland is well positioned to harness some of the potential of the growth in energy and environmental technologies and markets, in particular in renewable technology, waste management, waste water and water treatment, and energy related consultancy.

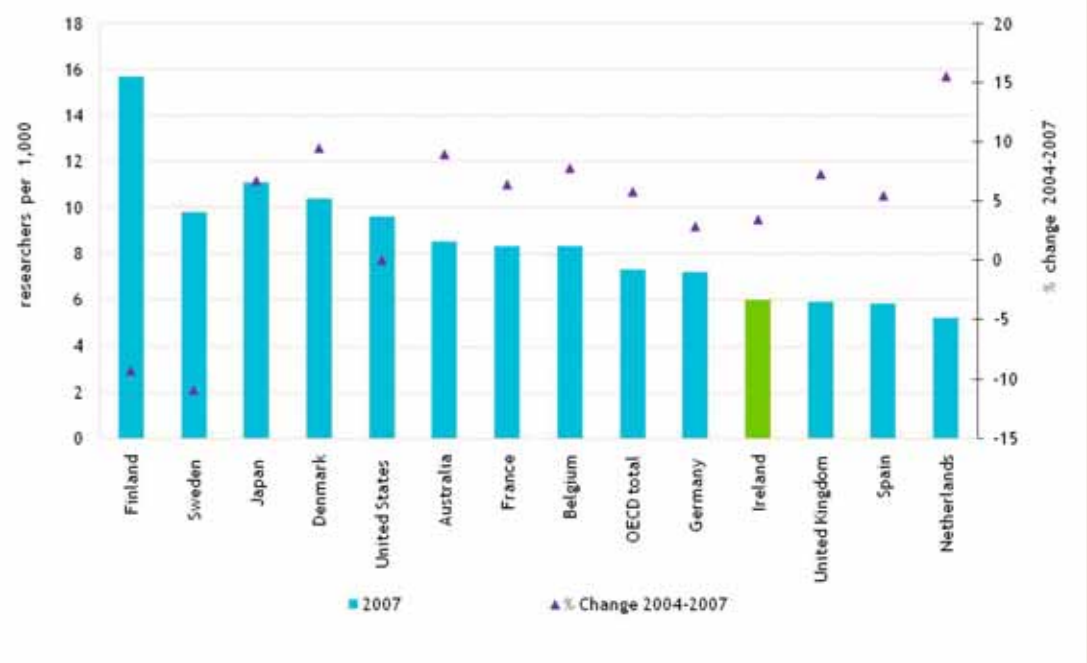
The environmental goods and services market globally is estimated at €750 billion and is expected to record double-digit growth over the coming years. Driving much of the growth are technological advances and the application of new business models in areas such as water, waste and energy management services, building and construction materials and design, and production process re-engineering. The projected developments in energy and environmental technologies provide opportunities for entrepreneurship and future enterprise development. Ireland has a natural competitive advantage with a well educated science and engineering skills base, a strong base of enterprises in related engineering services areas, a population receptive to the use of renewables and to addressing the challenges of climate change, and a unique geographic location with large wind and ocean resources.

Clean technologies accounted for $750 million of Silicon Valley venture capital over 2007/2008. Enterprise Ireland and IDA Ireland, together with SEI and SFI are actively seeking to develop an Irish presence in the fastest growing environmental goods and services areas. Having a base of skills and expertise in the underpinning disciplines will be key to the success of their respective initiatives.

Overall, to take advantage of the opportunities presented by the continuing explosive growth in technology in a range of areas, Ireland will need to position itself as an internationally recognised force in technology adoption, technology advancement and pro-technology policies. Initiatives such the development of Ireland's clinical trials infrastructure through Molecular Medicine Ireland are particularly important in ensuring we can take scientific discoveries through to commercial application for the benefit of patients.

As noted above, fundamental to innovation and exploiting developments in science and technology is having the necessary skills, knowledge and research base to exploit the new knowledge. The Government has placed a significant priority on developing the skills and absorptive capacity of enterprises to adapt and exploit technologies, whether developed in Ireland or internationally. This is consistent with the approaches in other developed economies as governments seek to accelerate the move to higher productivity, more innovation intensive sectors through raising skill levels and the number of researchers, as illustrated in Figure 9.

Figure 9: Researchers per 1,000 Employed, Full-time Equivalents, 2006



Source: Forfás & OECD

Summary

For the most part the technological breakthroughs of the future are as likely to be developed abroad as they are in Ireland the key is being able to absorb ideas for economic benefit. Ambitious management of competitive enterprises will continue to seek out the best available technologies or relevance to their sectors and markets. Enterprises will increasingly require access to a skills base that can capture and exploit those technologies and apply them to respond to market demands.

Technological advances and innovation will also continue to provide opportunities for entrepreneurship and wealth creation and will increasingly require more open collaboration and flows of information and people between research and business to ensure that those opportunities are realised. Technology, as an enabler of progress in the economy and society, will influence the way we live, work, and play. The key to taking advantage of technology advancements is flexibility in the economy, especially in regard to skills, business models and infrastructure.

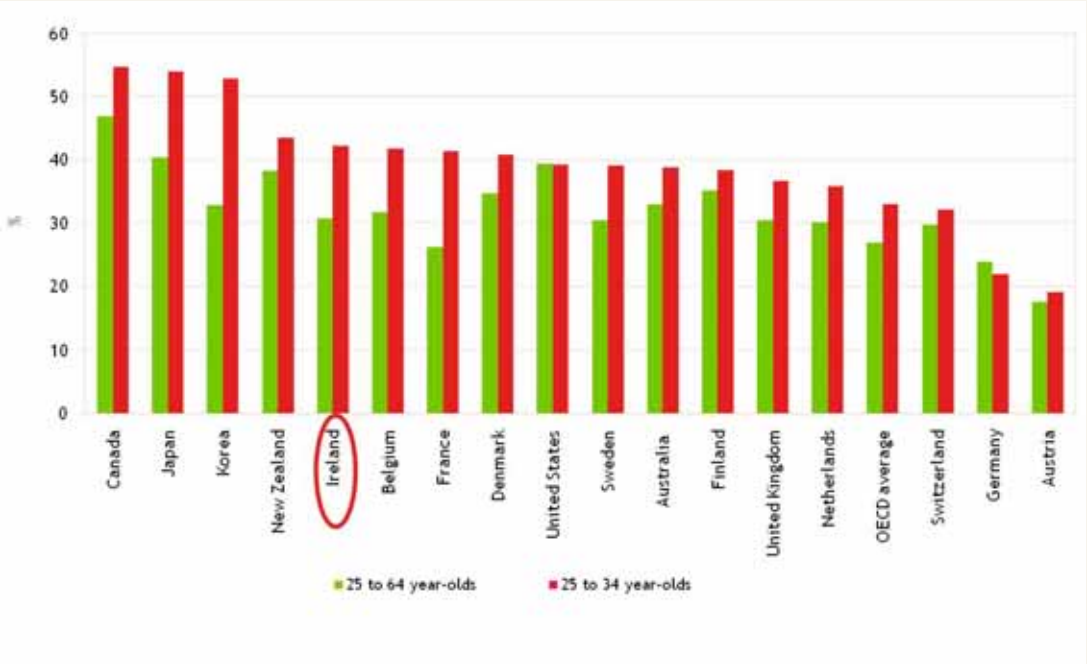
2.3 Education and Skills

Education is an enabler of change. It responds to and is affected by what happens in the economy and society on both a global and national scale. In a future driven by globalisation, knowledge, innovation and accelerating change, education systems will need to adapt to meet the needs of the economy and society as a whole.

An educated population is critical to almost every aspect of a country's well-being, and this is especially the case with regard to technology, as a well-educated and flexible workforce is a pre-requisite for development. A world-class education system is important to enable Ireland to continue to remain successful in the face of intensifying global competition.

Across OECD countries, governments are placing significant policy priority on improving national education systems and skills profiles. This reflects the understanding that more high-level skills are needed in a global knowledge economy and in the growth sectors requiring a more skilled workforce. In developed economies there has been a particular focus on the expansion of third-level education to improve jobs and productivity growth, see Figure 10. The OECD notes that in those countries that have not been expanding their third-level systems, there has been a rise in the relative risk of unemployment[15]. There is also evidence of better employment prospects and of higher earnings with improvements in education and training levels. For example, across the OECD average earnings for those with tertiary education over those with just upper secondary education are between 25 per cent and 100 per cent higher.

Figure 10: Third-level Education Attainment in OECD Countries, 2006



Source: OECD Education at a Glance 2008

15 OECD, Education at a Glance 2008.

Linked to enhancing the skills profiles of countries is a strong focus on R&D and innovation. As innovation becomes the driving force in GDP growth, creating new markets and enhancing value-added functions, R&D is one of the greatest markers of success. Increasing public and private investment in R&D is one of the key targets of the EU's Lisbon Agenda, which is seeking to restore European competitiveness to a world leadership position. Private industry has responded to the increased importance of innovation, and FDI becomes even more strongly linked to each country's education, infrastructure, quality of life, and business climate.

Ireland is starting from a low base and has a long way to go to catch up, but it is a fast follower and has many science and technology strengths. Redressing the relative lack of relevant skills and expertise to build on is the key priority of the Government's Strategy for Science, Technology and Innovation.

The Irish education system has been a major contributor to our recent economic growth and prosperity, not just in relation to the introduction of free second-level education in 1960s, but just as importantly through the major expansion of the system over more recent decades and improvements in participation rates and in educational attainment of our young people. The proportion of 20-24 year olds having completed at least upper secondary education has increased from 74 per cent in 1995 to 85 per cent in 2005. The proportion of school leavers going on to third-level is now at 55 per cent, up from just 36 per cent in 1992.

The number of full time students enrolled in our universities and institutes of technology increased by over 50 per cent between 1995 and 2006, totalling 134,000. Over the same period the number of part-time students increased by some 60 per cent to 35,000. The Higher Education Authority (HEA) estimates that the number of PhD graduates has doubled over the last decade, reaching a projected 1,000 in 2008, with these graduates having the highest employment rates of all graduates and being quickly absorbed into the workforce.

The Irish education system is facing a number of widely recognised pressures and trends over the coming 15-20 years that will have a direct impact on its mode of operation.

Demographic Challenges

Increasing numbers of school-going children, an ageing population with possible higher retirement ages, and a migrant workforce with differing skills requirements will put further pressure on the education system to deliver.

Changing Customer-Client Requirements

There will be a need for a demand-driven, responsive education systems (for both students and the market) to provide a highly technically skilled workforce with provision of hybrid courses (cross disciplinary training), flexible delivery requirements and changing work-study mixes.

Technological Trends

New developments in technology from Internet access to new teaching techniques are enabling the new digital learning environment. At its core, these technological advancements will redefine the role of the teacher, learner and content, as well as the balance between physical and remote locations (distance learning, elearning, multichannel access).

Continuing Education, Lifelong Learning

With a continuing move towards more service-oriented sectors, continuing education, lifelong learning and retraining will be ever more important. There will be increasing personal responsibility for the educational needs of the individual, increasing personal and occupational mobility, expanding education throughout society and throughout lifetimes.

Changing Working Environment

As the workplace moves towards a knowledge-based working environment, there will be a requirement for a flexible and adaptable workforce, a changing skills base, coupled with a rise in importance of generic and softer skills[16].

Increasing Competition

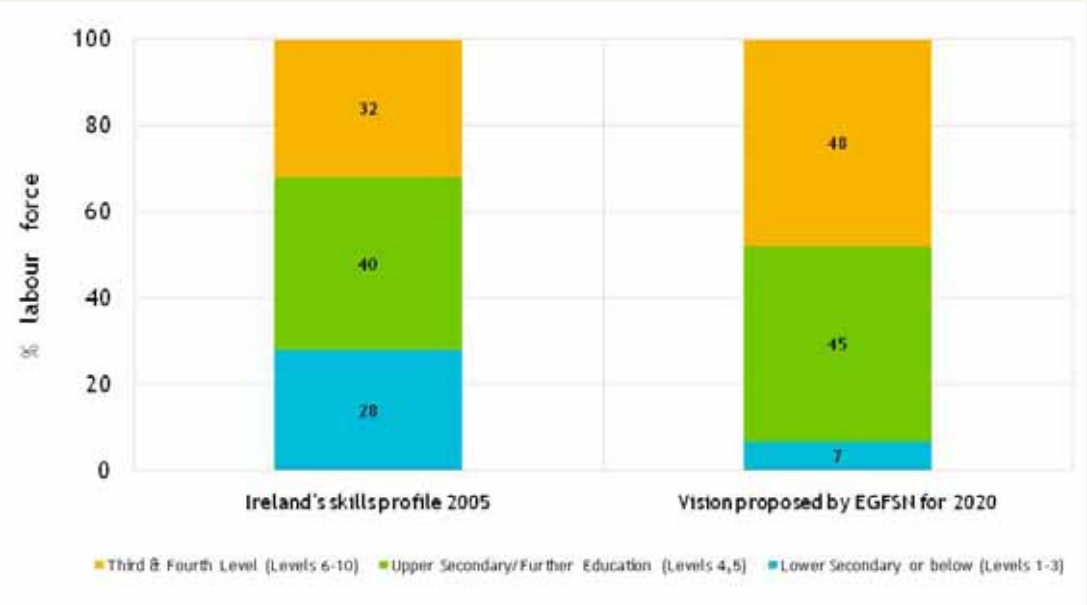
Competition among schools for students, educators and funds is increasing both globally and nationally, in part because of an increasing number of private sector providers.

World-class skills, education and training have been identified as a crucial area in which Ireland can develop competitive advantage. Significant challenges present themselves if Ireland is to achieve this.

The Expert Group on Future Skills Needs (EGFSN) in their National Skills Strategy Report proposes a vision of Ireland in 2020 in which a well-educated and highly skilled population contributes optimally to a competitive, innovation-driven, knowledge-based participative and inclusive economy. Specifically, the EGFSN concludes that if Ireland is to realise this vision of a new knowledge economy that can compete effectively in the global marketplace, it must enhance the skills of the resident population and continue to attract highly skilled migrants. Figure 11 illustrates the projected education levels as a percentage of the labour force by 2020, and includes a figure of nearly 50 per cent at third- and fourth-level.

16 Generic skills include basic skills such as literacy, numeracy and use of technology; people-related skills; conceptual skills such as collecting and organising information, problem solving, planning and organising, learning-to-learn skills, innovative and creative skills.

Figure 11: Education Levels as a Percentage of the Labour Force in 2005 and 2020



Source: EGFSN

Summary

A world-class education system is an imperative for economic development and overall competitiveness. Education is a significant strength in Ireland, a key factor in the success of the Irish economy to date, and an integral part of overall competitiveness. Education is also a weakness, needing attention and change.

Because of the rapidly changing global environment to which Ireland needs to respond there are concerns that the Irish education system will not meet the needs of the future.

Education, in general, needs to be more flexible and responsive to changing requires and requires greater investment in the longer-term. Therefore there is a need to overhaul the current education system by ensuring coherence of policy in light of international developments. The proposed development of a new strategy for higher education should reflect the changing nature of these requirements.

The future skills needs of the Irish society and the economy will change as we move away from a manufacturing economy to a more services-oriented economy. The education system will need to respond to this in a highly flexible, adaptable and demand driven way. The National Skills Strategy gives direction in this regard.

2.4 Social Values and Quality of Life

The changing values across nations and generations are becoming a key driver in the changing nature of work and different approaches to life. There is a clear move away from more traditional and collective values to more secular and individual values. Such lifestyles and values may be reducing social capital, valuing things and wealth above people and the community.

Irish society is changing. There is a strong move from community values to individualism and the diminution of the Catholic Church as a 'moral compass' is associated with weakening traditional structures and values.

Irish society is becoming less homogenous, showing greater differences on a number of measures such as skills, resources, access to infrastructure, mobility and cultural differences. There are certain dilemmas around social inequality that not only pose risks to the maintenance of social justice and cohesion but could also threaten the general commitment to an innovative culture that depends on good career opportunities and better quality of life.

While the need for immigration is clear to many, there are also many misperceptions and prejudices on the subject. Tensions are growing as a result. There is also a lack of confidence in what Irishness is and there is an argument that Ireland needs to rediscover and assert its own identity and values. In addition, significant problems of social exclusion remain: poverty, poor educational attainment, poor health, and social and civic marginalization, among others.

In developed countries quality of life is becoming a major driver of change for the future, not just as a component of economic success but also as an underpinning factor in the success of a society. Quality of life is hard to define or measure, but nonetheless has an increasing presence in the policy making process of governments, and in the life choices of individuals.

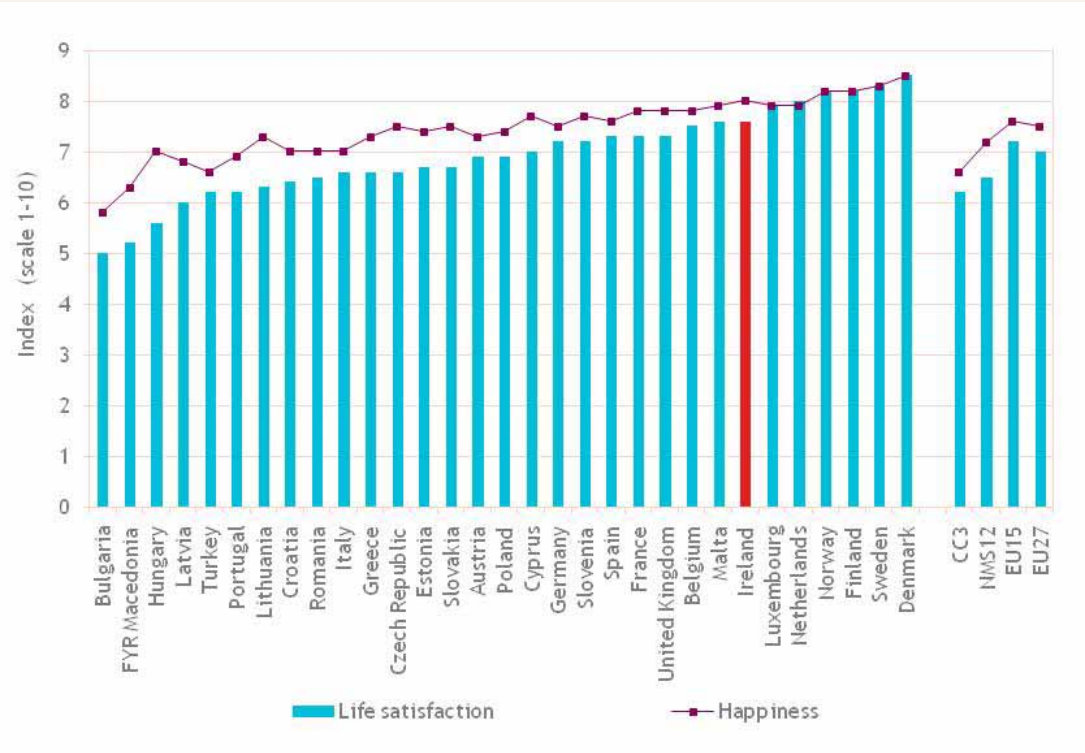
The quality of life of an individual depends on both the quality of society and factors that are specific to an individual's circumstances. The material assets of a society and its ability to provide jobs and income are of paramount importance. Other societal factors are also important, such as the quality of the political and social culture, the environment and infrastructures. The ability of a society to provide its citizens with the means to live according to their own aspirations and hopes is a fundamental part of people's quality of life. For most people it is also important that they see society progressing as a whole, and the way in which society as a whole progresses reflects how people's quality of life changes over time.

Freedom from poverty and deprivation are the basic components of the quality of life of the individual, but this also depends on access to educational, environmental, health, cultural and societal resources. The importance of social networks and people's ability to take part in them is not to be underestimated as a contributor to the quality of their lives. The social opportunities offered by family, friends, sporting occasions among others add significantly to the quality of life of the individual. Social alienation and loneliness caused by poverty, divorce, few family ties or lack of access to neighbourhood networks have a negative impact on the quality of individual's lives.

There is significant evidence that Irish society has a high quality of life by international standards. In terms of perceived well-being, Irish people consistently rank among the most satisfied in pan-European surveys and well above the EU average[17], as illustrated in Figure 12. According to the study on "Second European Quality of Life Survey" differences in life satisfaction are found consistently between social and economic groups within countries.

17 Second European Quality of Life Survey, European Foundation for the Improvement of Living and Working Conditions, November 2008.

Figure 12: Life satisfaction and happiness index, by country, 2006



Source: European Foundation for the Improvement of Living and Working Conditions, 2008

There are some negatives however. In general public surveys on quality of life issues highlight commuting times as having a particularly negative impact, and there is also a negative relationship with commuting and job satisfaction[18]. A report by the Institute of Public Administration (IPA)[19] suggests that long commuting times for dual-worker families may lead to increased levels of time pressure among those living in the new suburbs.

The use of technology would be especially beneficial in this regard. Greater roll-out and take-up of high quality broadband in Ireland would allow more people to work from home or from the regions, cutting commuting times and encouraging better work-life balance. There has been a trend to encourage flexible working from home, although research commissioned by BT on British workers suggests that the vision of the office workforce being liberated from their desks and being helped to regain control of their lives may not be achievable if not accompanied by adequate mobile technology, workplace policies and training that facilitates new working patterns.

At the heart of improving the well-being of people is income. A number of studies indicate that income is the main single determinant of the quality of life of individuals across the globe. While productivity, education, skills, demographics, innovation and technology, competitiveness and economic growth are the core drivers of income, there is growing

18 European Foundation for the Improvement of Living and Working Conditions.

19 IPA, Best of Times? The Social Impact of the Celtic Tiger (2007).

recognition of the importance of quality of life as a further driving factor. The International Labour Organisation (ILO) has identified a range of social and environmental factors important for our quality of life and which can enhance the competitiveness of firms and of the countries in which they operate[20]. The EU[21] is promoting the idea of 'decent work'[22] and has fostered the implementation of integrated economic and social policies to enhance the competitiveness of EU companies. The EU sees the promotion of social rights as a positive element. The European Council, noting the importance of improving productivity by promoting the quality of the working life, has also concluded that social sustainability strengthens the competitiveness of the EU.

Other research indicates that maintaining a work-life balance is increasingly important for staff. There is increased staff retention in firms offering an enhanced work-life balance. Some studies suggest that people are prepared to accept a lower wage to maintain a better work-life balance. This issue will become critical in years to come as businesses that do not provide a better balance will not be able to attract or retain talent. To remain competitive in the global search for the talent of the future, countries and firms will have to offer individuals a better quality of life.

There is also a drive at international level to encourage the engagement of the private sector in the promotion of social standards. Firms are increasingly taking corporate social responsibility measures as they seek to integrate social and environmental concerns in their business activities. Many large corporations are drawing up strategies to become carbon neutral; many companies now like to be seen as eco-friendly to give themselves a competitive advantage.

In Ireland the numbers at work have effectively doubled over the last decade from 1.1 million in 1990 to over 2.1 million in 2007. This was been driven by increases in participation rates and also by a flow of skilled workers into the economy, with immigrants accounting for 250,000 of those at work in 2007. However, most recent figures from the CSO show that Ireland is now experiencing a dramatic increase in unemployment. Numbers on the live register rose by 195,115 over the past twelve months to May 2009 bringing the total on the live register to 402,100– an increase of 97 per cent.

Employment alone is not sufficient for a high quality of life. Recent Conference of Religious of Ireland (CORI) research shows that while the number of people at risk of poverty has fallen by 120,000 since 2001, in part as a result of the improved employment opportunities in the economy, it remains the case that 30 per cent of households at risk of poverty are headed by someone in the labour force.

Health and healthcare provision is also an important aspect of the well-being and quality of life of an individual. The past decade has been a time of rapid change in many aspects of health in Ireland, including a growing population and population ageing. Life expectancy in Ireland is now above the EU-27 average, reflecting a rapid increase, unmatched by any other

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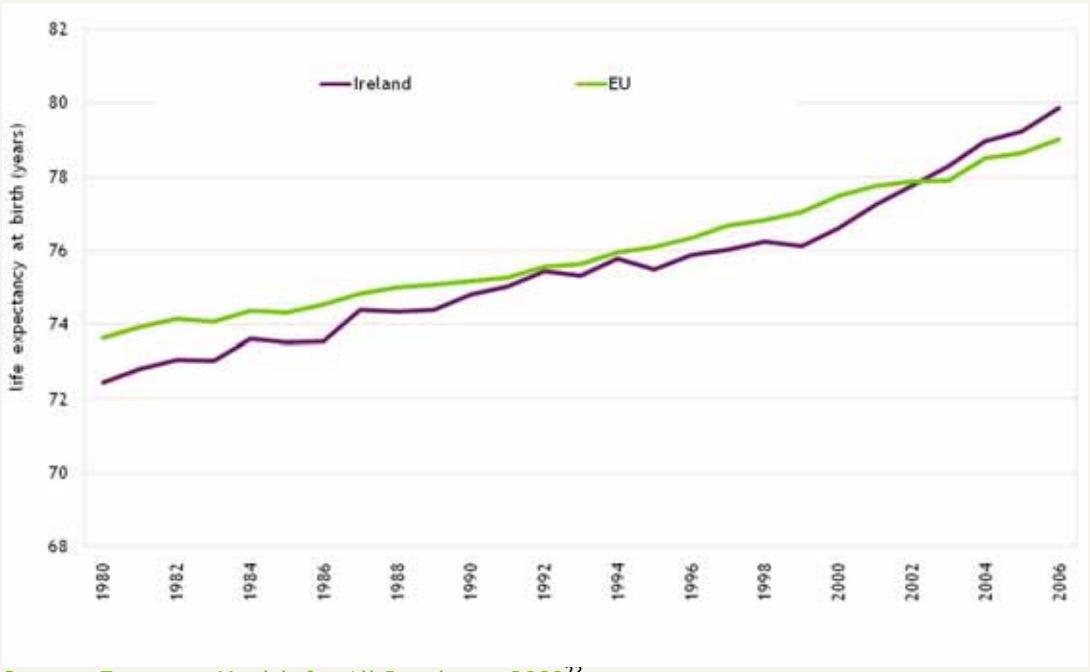
20 See International Labour Organisation "Decent Work" focused on encouraging social fairness by firms.

21 EU COM 249 (2006).

22 "Decent work" is defined by the ILO as the promotion of "…opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and human dignity. Decent work is the converging focus of all its four strategic objectives: the promotion of rights at work; employment; social protection; and social dialogue."

EU country since 1999, as shown in Figure 13. Much of this increase is due to significant reductions in major causes of death such as circulatory system disease.

Figure 13: Life Expectancy in Years at Birth for Ireland and the EU, 1980 to 2006



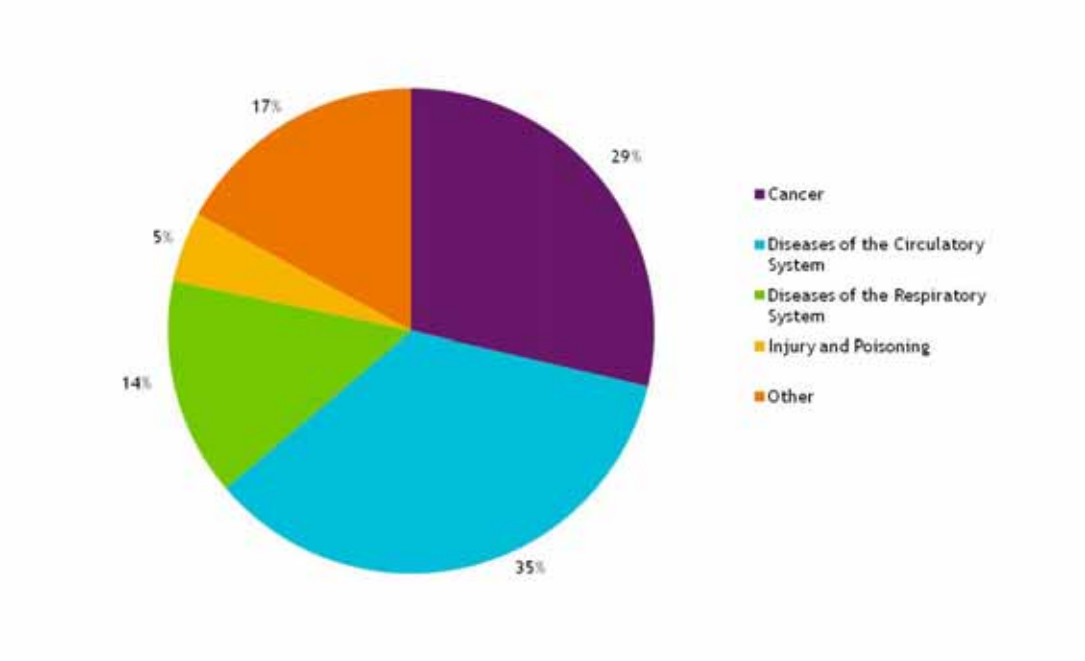
Source: European Health for All Database, 2009[23]

A report by the Department of Health and Children[24] shows Ireland has the highest level of self-perceived health of a range of European countries, with 83.7 per cent of men and 82.1 per cent of women rating their health as being good or very good. Nevertheless, the report noted that Ireland also shows very significant levels of chronic illness and limitations in activity strongly related to age. The principal causes of death in 2005 are shown in Figure 14. Diseases of the circulatory system and cancer accounted for a total of 64.5 per cent of all deaths in that year in Ireland.

23 http:data.euro.who.int/hfadb

24 Department of Health & Children, Health in Ireland, Key Trends 2007.

Figure 14: Deaths by Principal Causes in Ireland in 2005



Source: Department of Health and Children, Health in Ireland Key Trends 2007

With an increasing and ageing population also comes many challenges and demands for the planning and provision of healthcare services into the future and the need to take account of the associated increase in healthcare costs. As mentioned previously, long-term care will become an increasingly important issue for an ageing Irish population into the future. Lifestyle related risks are also major causes of concern. Preventative measures will become increasingly important as a mechanism for managing healthcare expenditure. Improvements in technology will facilitate advancement in remote monitoring and ehealth in general. Primary healthcare will play an ever increasing important role in the future as part of the healthcare system.

On a global level, the impacts of climate change when combined with growing and ageing populations and changing spatial distribution patterns may exacerbate the human impact and consequent healthcare requirements for the world population into the future. Human beings are already exposed to the effects of climate-sensitive diseases, and these diseases kill millions. They include malnutrition, which causes over 3.5 million deaths per year, diarrhoeal diseases, which kill over 1.8 million, and malaria, which kills almost 1 million.

Events in the past provide us with a reference for potential future disasters[25]. They include the European heat wave in 2003 in which approximately 70,000 more people died that summer than would normally have been expected; the 1997 Rift Valley fever in Africa (with major outbreaks associated with rains, which are expected to become more frequent as the climate changes); Hurricane Katrina in 2005 in which killed more than 1,800, displaced thousands and destroyed health facilities critically affecting health infrastructure; and, the

25 World Health Organisation.

malaria outbreak in the East African highlands blamed on warmer temperatures which over the last 30 years have created more favourable conditions for mosquito populations in the region.

On a more global scale we have witnessed the spread of the H1N1 strain of influenza that has spread from animals to humans.[26] Recently the WHO has raised the level of influenza pandemic alert (H1N1) from phase 5 to phase 6.This marks the beginning of a human flu pandemic. Influenza pandemics are recurring events. There have been ten in the past 300 years and three in the past century. It is not possible to predict when the next outbreak will occur or how many people will die, but the WHO advises that a pandemic is inevitable and that every country should be prepared.

These trends and events cannot be attributed solely to climate change, but they are the types of challenges we can expect to become more frequent and intense with climate changes. They will further strain health resources that, in many regions, are already under severe stress.

Summary

The quality of life has improved in Ireland and Irish people have been consistently well above the EU average when it comes to life satisfaction and happiness. But there are signs that the pace of economic growth has placed demands on scarce resources and that the quality of life has suffered as a consequence, in particular in relation to commuting and access to amenities and public services.

There are new challenges to the social foundations of development. The social bonus that contributed to Ireland's economic success should be further strengthened in light of changing economic conditions. The 'free' resource of familial and voluntary welfare provision in reproducing the social conditions for expanded employment and economic success will come under increased pressure as the balance shifts from homemaking to labour force participation among married women. Already, in the short-term, bottlenecks and new social costs have arisen from failures to address social dimensions of growth in a coherent fashion.

Understanding, responding to and building on these differences in all areas of policy and strategy in both public and private sectors will be crucial to future success, particularly in the international competition for talent and skills.

2.5 Globalisation

The world economy has changed dramatically in late 2008 and early 2009. The financial crisis has become a global crisis. While a worldwide recession is now taking hold, the global economy in 2030 will nevertheless be very different from today's. We now live in an interconnected global economy and the longer-term outlook for growth remains positive in terms of productivity growth underpinned by technological progress, and increases in education attainment and participation levels. The economic future will be shaped by many factors present today, but these factors will have much greater impact in the future due to structural changes in the global marketplace. Slower growth in developed economies and

26 'Business Continuity Planning – Preparing for a influenza Pandemic', Forfás, 2007.

rapid catch-up among developing nations, together with a significant increase in world population, the impacts of climate change and a changing technological environment, will all play a role in shaping the future global economy.

Emerging economies are driving growth, inflating resource prices and deflating wages albeit at slower rates than previously projected. They are creating major opportunities in a multi-polar world of growing markets and rising consumer expectations, but also creating potential conflict over resources, economic leadership and power. While the world economy in 2009 is in a period of adjustment, the medium-term outlook for growth remains positive. Provided the US can avoid an outright prolonged recession, Europe and Japan should continue to grow, albeit at slower rates than their potential. The rise of the yen and euro against the dollar will impact exports, but most emerging markets are expected to perform well, as are Russia and India.

While global GDP grew by 3.6 per cent between 2003 and 2007, the World Bank estimates that growth will slip from 2.5 per cent in 2008 to a decline of -0.4 per cent in 2009. Despite current difficulties the world economy could more than double in real terms over the next two decades from €35.6 trillion in 2007 to €72 trillion by 2030 and is very much dependent on strong performance in developing countries[27]. China has already become the third largest economy in the world.

Notwithstanding the current financial crisis and uncertainty over the short-term prospects for the US economy, forecasts project GDP growth potential at 2.5 per cent annually over the next 25 years, somewhat slower than the annual average of 3.1 per cent over the last quarter century.

For the US, slower population growth is also likely to impact growth. Since 1870 growth in non-farm output per hour in the US has averaged more than two per cent annually and productivity is projected to continue to grow at 2 per cent over the next 25 years, provided the US retains it technological lead, together with an increase in hours worked over the period.

In Europe, as population growth slows and labour force participation levels peak in the middle of the next decade, European-wide economic growth is forecast to slow to an annual average of 1.5-2.0 per cent to 2050. The European Commission projects that the EU-10 potential GDP growth will decline from 4.3 per cent annually from 2004-2011, to 3 per cent during 2011-2030 and 0.9 per cent from 2031-2050. Growth over the period to 2011 will be driven by high rates of productivity growth, as European enterprise continues to restructure, and also population growth and increased participation rates. However, from 2011 the sources of growth will change as employment growth will make a negative contribution and labour productivity, due in large part to technological progress, will become the dominant if not the only source of growth. The impact of slower labour force growth for Ireland was discussed in Section 2.1.

The EU continues to face significant challenges in progressing structural reforms in labour and product markets in the restructuring of education systems. The Lisbon Agenda provides a valuable framework for monitoring progress on reforms, but the actions required are essentially at national level and in some of the larger economies these have been difficult to

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27 Global Economic Prospects 2007: Managing the Next Wave of Globalisation.

progress. It seems unlikely that productivity levels in Europe, at 75 per cent of the levels in the US, will catch up with the US in the short-term, without the radical policy changes required being implemented. The outlook for the UK economy is for a sharply slowdown over the coming year with a contraction of -3.8 per cent forecasted for 2009[28]. The EU forecasts a contraction of -5.4 percent for Germany, -3.0 per cent for France and -9.0 per cent for Ireland.

Developing and emerging economies are projected to continue to grow in economic importance. Their share of world trade is projected by the World Bank to reach 50 per cent by 2030, from 30 per cent today and their share of GDP to reach 60 per cent in purchasing power parity terms. Per capita GDP in developing countries over the period 2010-2015 is expected to expand at a relatively strong pace of 4.6 per cent, much faster than the 2.1 per cent of the 1990s.

China, the world's largest economy up to 1890, is now second only to Germany as the world's largest exporter. It is also in the top three in terms of R&D investment. Chinese domestic demand in 2008 was forecast for the first time to become the main driver of world economic growth and will contribute more to global growth than US domestic demand. In 2007, 24 of the world's largest companies in the Fortune 500 were Chinese, a 50 per cent increase from 16 in 2005. The number of US companies stood at 162, compared with 176 in 2005 (the number of companies in the Fortune 500 from India increased from five to six and from Brazil increased from three to five). Developed economies are competing with developing economies such as China by accelerating the pace of structural reforms through continually moving up the quality ladder[29] and by raising the sophistication of their goods and services.

Despite its impressive growth, albeit from a lower base, and the emergence of a number of globally competitive companies in the ICT, steel and automotive sectors, India has yet to develop a competitive growth model and it continues to lose ground to China. In the 1960s Indian per capita GDP was equal to that of China's, but in 2008 was less than half and still losing ground.

While many African countries will continue to record strong growth rates, many of six per cent or more on the back of increasing commodity prices, the failure to create sufficient numbers of new jobs for urban dwellers and the absence of effective policy to do so will continue to give rise to tensions.

As part of the Supplementary Budget released in April 2009 the Department of Finance forecasts that the economic difficulties facing Ireland will persist well into 2010 with a re-emergence of positive growth in 2011 of 2.7 per cent[30].

In its Recovery Scenarios for Ireland of May 2009, the ESRI[31] predicts that the Irish economy has the potential to grow by an average of three per cent a year over the next decade, despite significant short-term problems. If the world economy recovers significant momentum

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28 European Commission, Directorate-General for Economic and Financial Affairs (March 2009) *Economic Forecast Spring 2009*

29 Schott, P.K., The Relative Sophistication of Chinese Exports, Economic Policy, January 2008.

30 Department of Finance, April 2009, Macro Economic and Fiscal Framework 2009-2013

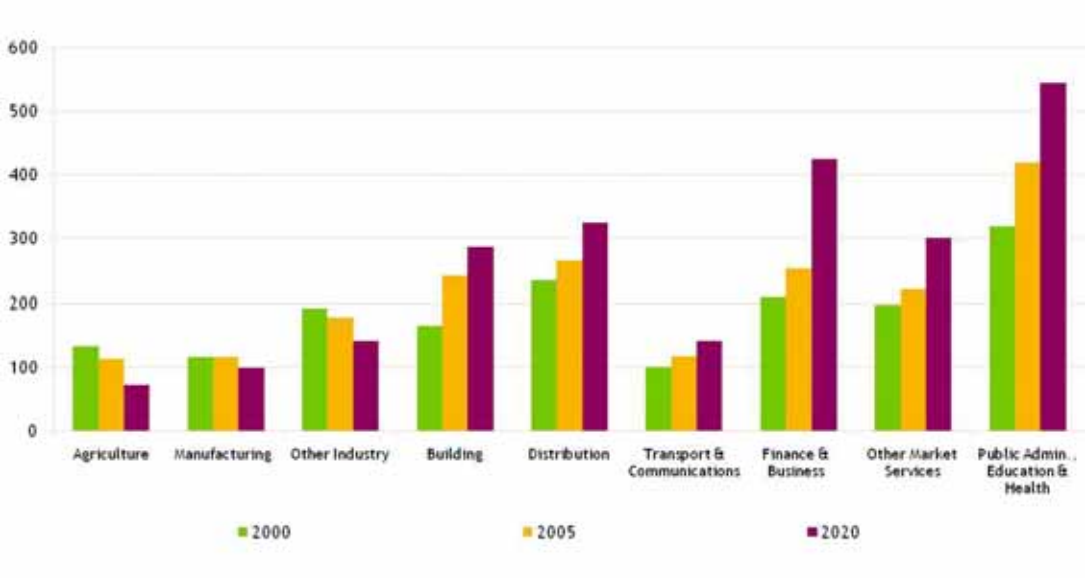
31 ESRI, Recovery Scenarios for Ireland, May 2009.

in 2010 and the Irish economy regains competitiveness it has the potential to grow rapidly between 2011 and 2015, by an average of five per cent per annum to 2015.

Developed economies are seeing an increasing dependence on the service sector and Ireland is no exception. Over 600,000 additional jobs were created between 1997 and 2007 and this increase in employment has been driven almost entirely by expansions in the services and construction sectors. Employment in services increased by approximately 480,000 between 1997 and 2007. Recent figures have shown that services now represent approximately 67 per cent of total employment in Ireland compared to 62 per cent in 1997.

Within the services sector, financial and other business services have been important drivers of employment growth. Employment in this sector grew by 21,000 in 2007. This reflects a longer-term trend: the sector experienced growth in employment of 68 per cent over the past decade. Services sectors are also expected to provide the majority of new jobs in the Irish economy over the next decade, with finance and business services growing by almost 200,000 employees, together with an increase of over 100,000 in public administration, health and education as illustrated in Figure 15.

Figure 15: Forecasts for Employment by Sector in Ireland to 2020 ('000 employment)



Source: ESRI analysis for EGFSN National Skills Strategy[32]

Services accounted for 44 per cent of total exports from Ireland in 2008. By 2025, the ESRI projects that market services will account for 60 per cent of net output or value-added in the Irish economy and in excess of 70 per cent of all Irish exports.

These trends are similar to the growth projections for the US over the same period to 2020. The US Department of Labour[33] projects the fastest growth in health and education, information, finance and business services, with a fall-off in employment in a range of

32 EGFSN = Expert Group on Future Skills Needs.

33 'Tomorrow's Jobs - Occupational Outlook Handbook, 2008-09', US Department of Labour, 2008.

manufacturing sectors. The rapid growth in services exports is also the most notable development in the evolution of global trade and Ireland has participated fully in this development. Ireland increased its share of world services exports from 0.36 per cent in 1980 to 2.6 per cent in 2008 and is now ranked as the eleventh highest exporter of services in the world[34]. Between 2000 and 2008 the contribution of services to total Irish exports increased from 21 per cent to 44 per cent[35]. Computer services are the most significant export sector, accounting for 33 per cent of services exports in 2007. Ireland also has a strong export base of insurance and finance services, and together they account for 25 per cent of total services exports[36].

Services exports are being driven by both the increasing servicisation of manufacturing, the increasing electronic delivery of goods and services, such as software and digital media, and the increasing liberalisation of services markets. The Internet is also giving rise to new information and communications related businesses that are trading internationally from remote locations. Figure 16 highlights a range of the new and emerging sectors where Ireland has been successful in attracting multinational investment, creating high-skill and well-paid employment in areas of activity that did not exist five to seven years ago. The Government's investment in initiatives, including advanced international broadband links through Global Crossing in the late 1990s, laid the foundations for Ireland's success in these new, high value-added areas. Continued developments in breakthrough technologies in the areas of ubiquitous computing, artificial intelligence, and forecast modelling are likely to further drive developments in these and other new ICT-related services areas[37].

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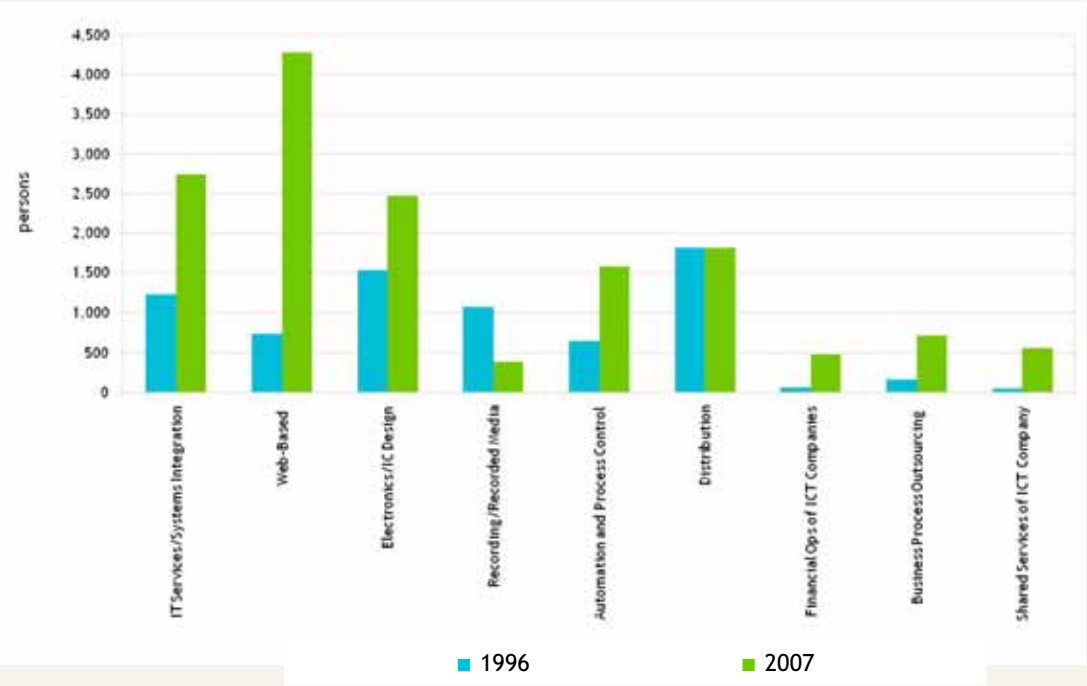
34 World Trade Organisation, 2009

35 Central Statistics Office, 2008

36 'Services Strategy Review', Forfás, September 2008.

37 Brown, David and Karen Petitto (2003), Educause, *The Status of Ubiquitous Computing*. Available at: http://www.educause.edu/ir/library/pdf/erm0331.pdf

Figure 16: Employment in New and Emerging ICT Sectors in Ireland, 1996-2007



Source: EGFSN analysis of Forfás Annual Employment Survey

Employment in education and health services is projected to grow by 19 per cent in the US to 2020, an increase of 5.5 million jobs and equivalent to three out of every ten new jobs created. The 'information sector' in the US contains some of the fastest growing computer-related industries. They include software, Internet publishing and telecommunications carriers, sectors that are projected to grow employment by between 30-40 per cent to 2020. In manufacturing, employment in the US is expected to decline by some 10 per cent to 2020 across a range of sectors, with the exception of the pharmaceutical and medicine manufacturing sectors where employment is expected to increase by 24 per cent to 2016 alone.

Sovereign wealth funds are likely to increase in influence in international financial markets, along with stronger, larger multinational companies. These funds manage assets worth an estimated $3,300 billion and will oversee $10,000 billion by 2015, with most of the large funds controlled by oil rich states and Asian countries whose trade surpluses have built big foreign exchange reserves. These funds are moving quickly from investing in minority stakes in managed funds and other financial instruments to more direct and meaningful financial participation in corporate entities across sectors from financial services and insurance to transport, ICT and life sciences. The potential impact of these stakeholdings on future corporate investment and other decision making is as yet unclear. There is also an estimated $5,300 billion of foreign exchange reserves held in more liquid investments[38].

38 International Financial Services London estimates as of March 2008.

The equivalent for Ireland is the National Treasury Management Agency's (NTMA) management of the National Pensions Reserve Fund.

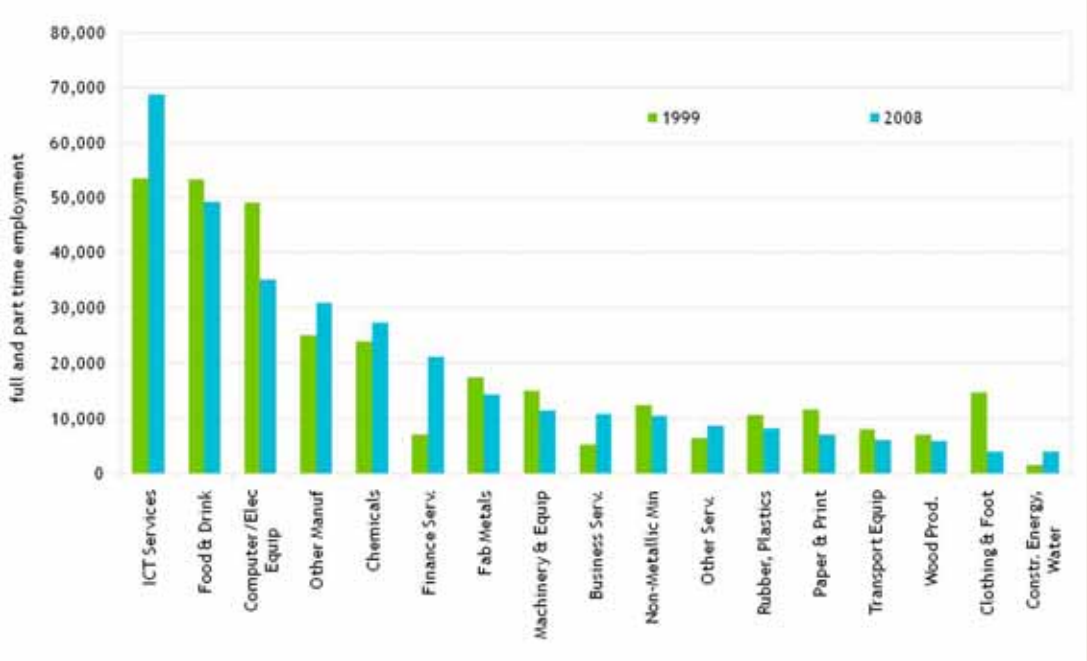
In addition, the development of more sophisticated approaches to the development and management of Sharia-compliant financial instruments is increasingly internationalising Islamic sources of funds and its potential influence in the corporate sector. Islamic banking assets were estimated at $500 billion in 2007, up from $140 billion in 2000. The UK has moved quickly to establish itself as the centre for Islamic finance in the West, by changing laws to allow the creation of Sharia-compliant bonds and to make sukuk bonds more tax efficient. More than $11 billion of Islamic bonds were registered on the London Stock Exchange in March 2008. The importance of such funds is likely to increase in the future.

Structural change is a natural and inevitable feature of economic development. Market and industry structures will continue to change in the future. Much progress has been made in the transformation of the Irish economy over recent decades. There have been episodes of significant industrial restructuring, including substantial job losses, with some sectors transforming into more productive and innovation intensive activities.

As illustrated in Figure 17, the last decade has seen decline in many traditional sectors of employment and wealth creation in Ireland, while at the same time witnessing employment growth in a range of new sectors including international and financial services, chemicals and medical devices. In relation to the agency-assisted base of internationally trading enterprises, while there is significant sectoral change underway there is also significant change within sectors. The 2008 employment survey indicates that even in sectors with overall net increases in employment, there are double digit rates of job churn in sectors such as ICT, pharma and international services[39].

39 e.g., IDA ITS 2007 employment of 39,270; job losses 3,408, job gains 3,377, net change -31. EI ITS 2007 employment 23,781, job losses 2,201, job gains 3,967, net change +1,766.

Figure 17: Distribution of Agency-Assisted Employment by Sector, 1999-2008



Source: Forfás Annual Employment Survey, 2008

At market level, the middle ground is thinning as markets polarise into high-end and low-end value products. Big companies are getting bigger, through takeover and mergers and small companies are able to compete in global markets supported by the Internet. Boundaries between sectors and between suppliers and customers are blurring. Coupled with this is the increasing importance of networks and collaboration. Increasingly, competition is between networks of firms in the same industry aligned around standards or market segments. For example in the US software industry, the percentage of publicly quoted firms that engage in alliances increased from 32 per cent to 95 per cent from 1990 to 2001 and the average number of alliances per firm rose from four to more than 30 over this period[40].

Ownership and investment by the private sector in strategically important infrastructures and utilities, many of which were previously either publicly owned or provided, is increasing, giving rise to more complex regulatory requirements, many of a transnational nature.

International trade agreements will play a much stronger role in the future, reflecting the rise of supranational governance[41] regimes for trade. Digital trade is likely to dominate the growth industries in the future, facilitating unprecedented wealth creation. National governments will have staked out niche markets, utilising national 'branding' to ensure a piece of the global pie that flows from the Internet.

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40 Lavie, D., 'Alliance Portfolios and Firm Performance', Strategic Management Journal, December 2007.

41 Ladeur, Karl-Heinz (2008), *'We, the European People*, European Journal of Law, Vol. 14, Issue 1.

Reference to political issues, in particular developmental and environmental issues, is increasingly influencing consumer spending, as buyers link their political and purchasing decisions.

The effects of climate change are radically altering the landscape of many countries, creating economic devastation for some, while leading to increased opportunities for others[42]. Rising food prices and shrinking access to water resources widens the divide between rich and poor. Political platforms, aid programmes, and immigration laws may become completely enmeshed with national investment choices, creating spheres of influence and power that stretch around the globe.

In this context small nations like Ireland generally have an advantage in developing and implementing new ideas, in forging partnerships with innovative enterprises and increasingly in establishing themselves as partners for other countries in the global trading environment. The accessibility of the Irish administration is also a positive part of its size. Ireland's image as a small friendly nation makes for a powerful brand. The English language, strong links with the US and membership of the EU all enable Ireland to punch above its weight. Ireland has particular competitive advantages including the following:

- **Food and drink:** Ireland's main indigenous sector by employment and output offers further potential to develop higher value-added products and related services;
- **Healthcare and life sciences:** Ireland has a strong base of indigenous and multinational enterprises together with a burgeoning clinical research base focusing on improving well-being; and
- **Energy, environmental and clean technology:** offers potentially significant opportunities, given Ireland's resources and location.

However, the preparedness of the Irish population, in particular younger generations, for a severe economic downturn is questionable. Any correction to a lower growth, sustainable economy may not be pain free as companies, consumers and the public finances adjust.

Summary

Despite the difficulties of the current financial crisis, the lack of confidence in the short-term economic outlook and the deepening global recession, the growth potential for the world economy over the medium to long term remains positive. While growth may slow in Europe and the US due to slowing population growth and ageing and peaking participation rates, other parts of the world are likely to continue to experience high rates of economic growth as they catch-up with currently developed economies. Rising population growth and growing consumption together with increased access to capital and technology will drive growth in these regions.

Ireland's ability to attract investment and new business skills and talent into the economy has been critical to growth and success of the Celtic Tiger. Ireland needs to continue looking for new opportunities in high growth and high productivity areas. Forward-looking governance to

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42 Stern, Nicholas (2006), Government Economic Service and Adviser to the Government, Office of Climate Change, HM Treasury, *Stern Review on the Economics of Climate Change*.

underpin the correct approaches to education and skills advancement is a critical element of a successful enterprise base out to 2025.

Ireland has provided an attractive gateway for international investors to access European and wider markets and a link between cultures and continents to help others enter markets. Of necessity Ireland is a flexible, responsive, outward looking country and economy. The biggest danger for Ireland is complacency by continuing to rely on past successes for growth and prosperity, and allowing others to overtake us. A huge opportunity for today's policy makers is instituting current infrastructure decisions to underpin economic goals for the future. These decisions will in turn have enormous knock-on effects on competitiveness from innovation activities, energy security and supply, and regional dispersion and economic success.

2.6 Infrastructure

The level of infrastructure in a country affects competitiveness in a number of ways. Well-developed infrastructure can improve the flow of people, goods, services and finance, as well as increasing productivity and reducing costs. This not only affects existing firms, but also a country's attractiveness as an investment location and the overall quality of life it can provide.

The next decades are likely to see an emphasis on the importance of infrastructure development. According to an OECD report on infrastructure to 2030[43], infrastructure development will provide a vital tool in resolving some of the major challenges faced by societies, including supporting economic growth, meeting basic needs and facilitating mobility and social interaction. But investment in advanced infrastructure is also a key issue in addressing environmental pressures in the form of changing climatic conditions, congestion etc., placing a stronger focus on the inherent tensions between the imperative for further infrastructure development and the quest for sustainability. Developing a greater public understanding of the importance of advanced infrastructures for sustainability will be key to whether countries can make the necessary investments in the built environment to prepare for population growth and economic change.

Infrastructures have long pay-back periods, in some cases over generations, and also take a long time to build, so that bringing about improvements in infrastructures requires long-range thinking and vision. Because of their long lead time, it is also vitally important that investment plans and infrastructure projects have the right trajectory for the future.

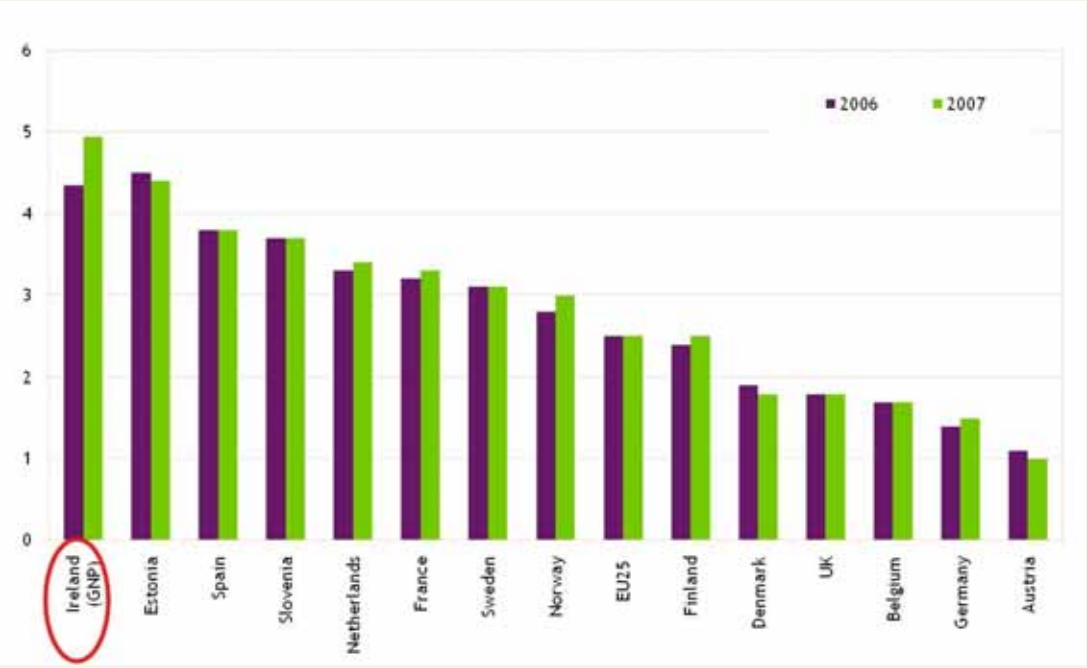
Dispersed population patterns and rapid population growth combined with decades of low investment in physical infrastructure prior to 2000 have led to a serious infrastructure deficit in Ireland, as compared to other OECD economies. A world-class physical infrastructure is necessary for Ireland's continued national competitiveness as well as for making a direct contribution to an improved quality of life.

43 OECD: Infrastructure to 2030 – Telcoms, land transport, water supply and electricity.

While Ireland has committed to unprecedented investment in physical infrastructure development, evidence from the National Competitiveness Council (NCC) Benchmarking Report of 2007 illustrates that we have further progress to make to achieve a world-class infrastructure. Compared with the OECD average, the overall infrastructure quality in Ireland is low. Ireland ranks 25 out of the 28 OECD countries.

The National Development Plan (NDP) 2007-2013, *Transforming Ireland – A Better Quality of Life for All* sets out a range of economic and social investment priorities for the next six years that will deliver a better quality of life for all and which is consistent with the ten year social partnership framework agreement, *Towards 2016*. The NDP tackles economic and social infrastructure deficits in areas such as transport, energy, housing, water, education and health. Total expenditure is to be €184 billion over the period to 2013, of which €100 billion is allocated to capital investment. Although in light of the current economic difficulties cuts will be necessary, the direct exchequer capital expenditure will still average 4.24 per cent from 2009 to 2014. The Department of Finance expects that significant reductions in tender prices that are a very large part of the NDP will be achieved over the time frame. The NDP supports a wide range of issues of important relevance to developing a sustainable and competitive enterprise sector, including continued investment in enterprise development, physical infrastructure, skills development, science, technology and innovation and quality of life. The 2000-2006 NDP resulted in higher levels of investment in gross fixed capital formation (as a percentage of GNP) in Ireland than in other EU countries, as illustrated in Figure 18.

Figure 18: General Government Gross Fixed Capital Formation (% GDP), 2006/2007



Source: Eurostat Database

The relatively recent introduction of five-year rolling capital envelopes (10 years for transport) gives government department's greater predictability, and some flexibility, in planning and managing infrastructure investment and delivery. This is particularly important given the scale and timeframe of many of Ireland's modern infrastructural projects.

To ensure their timely implementation there are a number of issues of critical importance to continued growth and competitiveness on which attention now needs focused. These are transport, energy, broadband, waste, science, technology and innovation and human capital development. Priorities from an enterprise development perspective identified in a Forfás review in 2007 included the following:

Transport

Completing the inter-urban motorway network with prioritisation of those parts that support economic development, and improving peak speeds in Dublin and other gateway cities is crucial. Improving air connectivity and seaport capacity infrastructures is also of high importance.

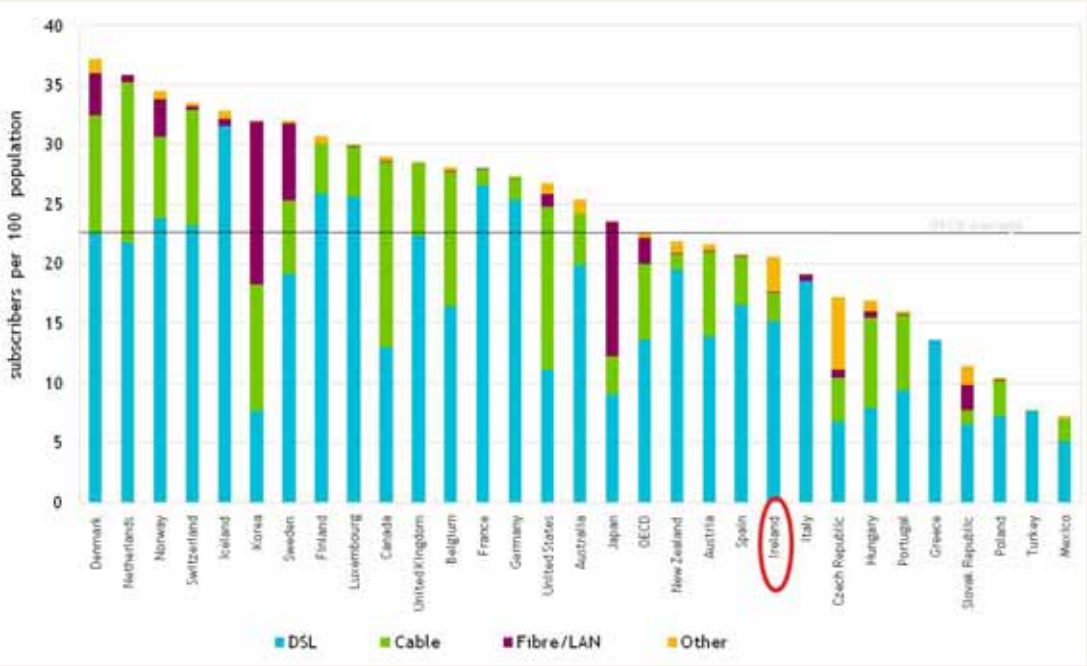
Energy and Waste Management Infrastructure and Services

To meet the increase in demand for both the quantity and quality of electricity services and also to meet GHG emission targets, significant investment is needed and planned in energy infrastructure over the next decades. Public opposition is a key barrier to the timely development of the necessary infrastructures. A new approach will be required to develop a more inclusive way forward with communities.

Broadband

Ireland is currently not well placed to take advantage of future trends in broadband. A recent Forfás broadband benchmarking study showed that the number of broadband subscribers has doubled since 2005 and mobile subscriptions are growing rapidly, but Ireland's relative position has not improved as other countries are moving ahead at an even faster rate. The fastest broadband widely available in Ireland in 2008 is 12Mbps. In Sweden the comparable figure is 100Mbps, and Korea and Japan have networks that bring 100Mbps to the home and have set a goal of having new networks with speeds of up to 1Gbps. As illustrated in Figure 19 Ireland remains in a catch-up position relative to leading countries such as Denmark, Netherlands and Sweden and is well below the OECD average.

Figure 19: OECD Broadband subscriptions per 100 habitants, December 2008



Source: OECD, 2008

The Government has placed a strong priority on broadband in the 1990s and early 2000s and taken a number of initiatives including investment in international connectivity, regional networks, metropolitan area networks and initiatives to connect schools and third-level institutions to high capacity. These provide the platform for further addressing the bottleneck in the local access network.

Summary

Almost all forms of infrastructure are under pressure from increasing demand and population growth. Longer-term vision, coordinated implementation and planning for and strengthening Ireland's regional cities and improving regional development and investment are therefore of vital importance. Indeed infrastructure is one of the most critical elements of a successful enterprise base in Ireland in the future. Without the ability to attract and retain FDI and skilled foreign workers through excellence, or even adequacy, in infrastructure, Ireland's enterprise base could be seriously threatened. The expansion of the economy and social welfare out to 2025 hinges upon a good infrastructure base. As the digital divide grows and Ireland faces more competition for FDI within Europe, good infrastructure has the potential to bridge the competitiveness gap by allowing Irish firms to advance in ICT, science, and environmental goods and services. The issues of regional competitiveness and balanced patterns for growth in expectation of the huge demographic changes in the future require continued investment in infrastructure development.

2.7 Governance and Regulation

As globalisation continues, the UN and its agencies, the World Bank, the WTO and other international organisations, even multinational companies, will have an increasing significance in the decades to come. Such bodies will play increasingly important roles in the future in satisfactorily managing global issues such as the trade effects of increased globalisation, poverty, distribution of development aid, the effects of climate change, internecine wars and issues which cause the mass dislocation of people and the movement of refugees.

The development of international agreements in addressing many of the key energy and climate change and economic and regulatory issues will make it more important for national governments to find ways to influence the outcomes of global agreements through international coalition and partnering on national issues. From Ireland's perspective, the role of the EU in such international decision-making is likely to increase.

However, international organisations will need the political acceptance and negotiating capacity to regulate trade at a global level. There is already a tension between developed and developing countries in this regard and the developing economies of China and India will continue to have a profound effect on the global economy. The participation of China and India in global marketplaces approximately doubles the global labour force and boosts the supply capacity at global level. The challenge for developed countries will be to take advantage of the opportunities provided by the emerging markets without feeling threatened and reverting to economic nationalism.

The international negotiations on trade under the auspices of the WTO are important in this context. The eight rounds of trade negotiations since 1947 have each provided for improved market access for goods, and in more recent times services, and have facilitated increasing flows of investment, technologies and access to markets that have underpinned Ireland's recent prosperity. Such negotiations are increasingly important for growing trade between developed countries but also for developing countries to increase access to markets and to achieve their trade potential.

In terms of global governance the world is vulnerable in its ability to respond cohesively to big issues of common concern, such as to climate change, regional conflicts or its preparedness for an imminent flu pandemic. Unilateral action by individual countries and a lack of a concerted, fast and decisive worldwide effort to deal with the global credit crisis, for example, shows that the processes for achieving consensus are often at odds with the need for speed of response.

In Europe, there is an ongoing effort to move the EU nearer to the people, reflecting a trend of greater recognition of the importance of 'people power' in the decision making process. Citizens now demand more transparency in decision making and in some areas, especially environmental issues, people are running ahead of governments and have greater expectations and make more demands for change.

The role and power of public debate is changing. The advance of the Internet and technology means that people are becoming more connected than ever before. People's awareness of global issues is on the increase and people are increasingly agitating around global issues. Celebrities are also getting involved in and highlighting particular issues. The combination of ordinary people, celebrities and technological change is significantly changing the nature of the public debate.

Transnational public debate and multinational governing bodies also affect the pressures and demands on multinational corporations. The growing importance of global supply chains will ensure that the governance of multinational corporations (MNCs) is increasingly important. Firms will continue to source and produce lower-end consumer goods and intermediate products from developing countries, where the costs of production are lower, and sell them in the developed countries. The conduct of the MNCs and how they treat workers in the developing countries can affect how MNCs are perceived, their corporate brand and image and ultimately their profitability of the enterprise on a global scale.

Therefore as communication networks improve, it will be increasingly important that MNCs are seen to have responsible governance in place, including insightful corporate social responsibility plans and 'green' credentials. The tendency towards mergers and acquisitions means that finance and profits are increasingly concentrated. There will be a greater role for global financial markets, consumer bodies and issue-based global governance bodies to improve the governance of MNCs and fight corruption. Governance structures will also be necessary to act as a global watch-dog to prevent global players from becoming monopolies, to counteract monopolistic tendencies at a global level and to promote the protection of workers and the environment.

Summary

How Ireland organises itself at local, regional, national and international level will be extremely important in the future. Future challenges, globally and nationally, will become more complex and more interrelated than ever before. The global imperative is making it more difficult for national governments to influence outcomes. The response to these challenges requires multifaceted and sophisticated policies that require an effective governance system to deliver.

2.8 Energy Supply and Security

Energy demand is increasing globally but so too is the potential unreliability of supply. The continued global supply and availability of energy sources are under increasing strain due to burgeoning populations, increased demands arising from infrastructure development, a growing built environment, and growth in the transport sector.

Global primary energy demand is projected to increase by 53 per cent between 2004 and 2030 – an average annual rate of 1.6 per cent. According to the International Energy Agency (IEA), demand for electricity is set to grow by 55 per cent by 2030. Collectively, non-OECD countries will account for 87 per cent of the increase with India and China alone accounting for over half of the increased demand over the coming decades, while the Middle East emerges as a new demand centre.[44]

In Ireland, energy demand increased by over 63 per cent from 1990 to 2005, in large part due to increased requirements from the transport sector. The demand was met by fossil fuels, principally oil, gas and coal. Ireland is now the most oil dependent economy in the EU, as

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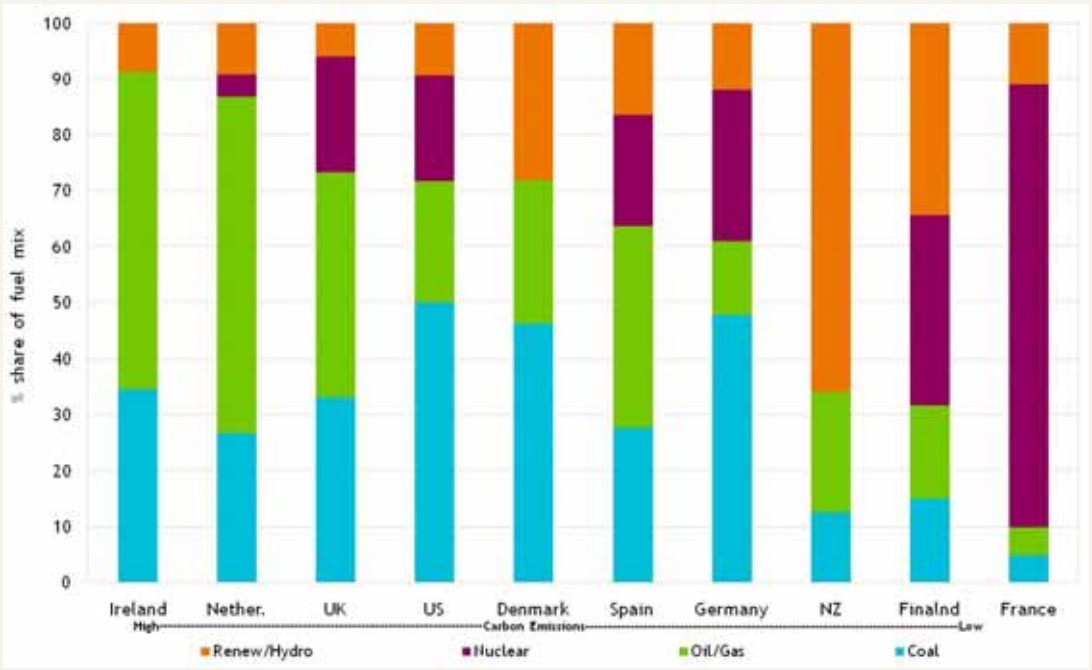
44 International Energy Agency (2007), *World Energy Outlook 2008.*

highlighted in the 2006 Forfás report on oil dependency[45]. Greater rates of car ownership and increases in car engine size are adding to Irish demand for oil. Ireland is also one of the countries most dependent on fossil fuels such as coal, gas and oil for electricity generation, as illustrated in Figure 20.

Figure 20: Fuel Mix in Energy Generation and Consumption, 2007



Source: OECD

Fossil fuels availability will be compromised in the future, given the estimates on the timing of peak oil. These range from five to 30 years, with most experts predicting the onset to occur by 2025, if not over the next ten to 15 years. BP estimates that if 2006 production rates were maintained, global oil reserves would run out in just over 40 years. America and China have little over a decade before their oil reserves are exhausted. Since 1981, the world has, on average, been consuming more oil each year than is discovered. According to Robert Hirsch[46], 33 of the world's 48 largest oil producing countries now have declining oil production levels.

Current world oil consumption is equivalent to 11.4 billion tonnes of oil equivalent (toe) per year. This is estimated to increase to 17.7 billion toe per year by 2030[47]. Meeting this demand will be a challenge. Figure 21 presents global fossil fuel production and discovery trends. With an expected peaking of conventional oil production, attention will turn to non-conventional oil production and use of heavy oils such as oil from coal, shale oil and tar sands as well as further extraction from the existing oil wells but at a much higher cost.

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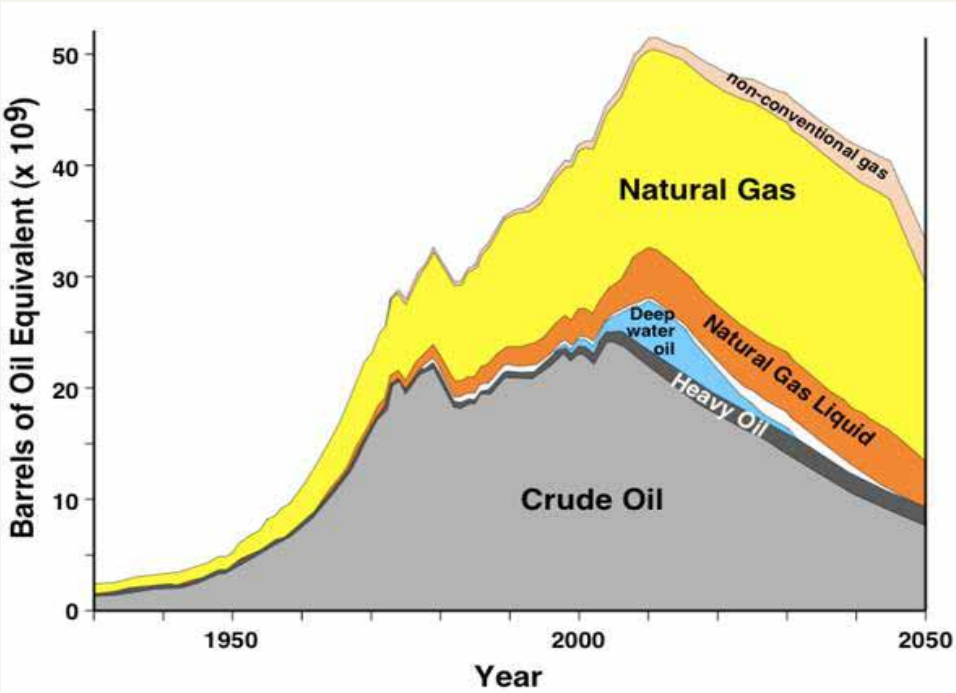
45 Forfás Report "A Baseline Assessment of Ireland's Oil Dependence", April 2006.

46 Hirsch, R., "The Atlantic Council of the United States", Oct 2005.

47 Ibid.

Figure 21: Global Fossil Fuel Production and Discovery Trends



Transport will remain one of the largest and fastest growing sectors for oil demand, with over one fifth of all additional oil demand arising in the transport sector. Despite concerns over the escalating price of oil, liquid fossil hydrocarbons are forecast to remain the predominant fuel for the motor vehicle sector out to 2020.

There are alternatives to the growing use of oil in private and public transport and these are likely to become increasingly viable into the future as oil prices increase and alternative automotive technologies become more viable. Alternative technologies include the growing use of hybrid and electric vehicles, in particular for non-commercial transport, incorporating the increasing availability of low carbon-intensive electricity generation sources including renewables and nuclear energy. It is estimated that in the US, for example, 80 per cent of non-commercial vehicles could be recharged overnight using the spare electricity from the nuclear energy baseload. Similarly, for Ireland, the ESB estimates that it would require only 2,000 MW of electricity to recharge Ireland's cars overnight[48], equivalent to about a quarter of current generating capacity.

The role of natural gas in worldwide energy production is rising, as countries shift energy production from carbon-intensive sources to cleaner technologies, one of which is natural gas. Europe's import dependence on gas is increasing, and based on current trends imports it will increase from 50 per cent to 70 per cent by 2030. Today, roughly half of the EU's gas consumption comes from only three countries (Russia, Norway, and Algeria) through interconnectors. Additionally, use of liquefied natural gas (LNG) as a fuel is growing and is subject to price and supply shocks similar to natural gas. It is expected that over 80 per cent of gas used in Europe over the next 25 years will be imported by pipeline and other means.

48 P McManus, CEO, ESB, at the IMI Annual Conference, 3 April 2008.

Ireland has grown increasingly dependent upon gas, as oil-burning electricity production plants are replaced with natural gas plants, which now accounts for 44 per cent of electricity generation. Additionally, several co-firing production plants have added to the increased use of natural gas. As our main indigenous supply of gas at Kinsale ceased in the late 1990s, European sources now supply our natural gas via two interconnectors with Scotland. The Corrib Gas field, scheduled to come on stream in 2010, has an expected operational life of 15-20 years, with an annual capacity of 40,000 GWh for the first three years, falling to approximately to 25,000 GWh by 2012/13.

In addition, gas is increasingly transportable by means other than pipelines and Ireland's first liquefied natural gas facility is currently at the planning stage. The Shannon LNG facility is scheduled to come on-stream by 2010. It will provide an element of competition in gas sources and an important supply point for Irish natural gas separate from the UK interconnector.

Coal remains an important source of energy for Ireland, with 11 per cent of the State's electricity provided by coal generators at Moneypoint. There has been a resurgence in the use of coal for electricity production worldwide in recent years due to lower costs and greater availability compared with oil and gas. The IEA predicts that worldwide demand will grow at 2.2 per cent annually to 2030, faster than the rate of increased demand for either oil or natural gas, with demand in China and India accounting for two-thirds of the increase[49]. China and India are planning major investment in coal, which will account for 80 per cent of the targeted increase in world coal usage. Currently China is investing at a weekly rate of 2,000 MW of coal fired plant and is expected to require 4.5 billion tonnes of coal by 2030. These increases in coal usage, based on traditional carbon emitting generation technologies, will continue to have implications for global GHG emissions pending the development of new technologies such as 'clean' coal generation. It is anticipated that clean coal technologies will alleviate some GHG emissions and could be economically viable for mass generation in countries such as Ireland by 2030 or 2035.

Renewable energy sources, including currently widely available technologies such as wind and solar, will become increasingly important fuel sources for Europe by 2030 if current trends in European energy policy are maintained. Renewable energy is not without its costs; it is currently among the most expensive types of energy. There are also issues in relation to reliability and the need for backup generation and interconnectors.

Wind production in Ireland has shown considerable progress in recent years, growing to over 1077 MW of capacity installed in 2008[50]. Despite these developments, all energy produced from renewable sources accounted for just under 8.6 per cent of electricity generation capacity and less than three per cent of the total energy consumed in Ireland in 2007, well short of the 20 per cent targets recently set by the European Commission. However, the recent *All-island Grid Study*[51] indicates that it would be technically feasible to generate 42 per cent of our electricity from renewable energy sources by 2020.

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49 IEA (2003), *World Coal Demand and Supply Prospects*, Available at: http://www.iea.org/textbase/papers/2003/ciab_demand.pdf

50 Eirgrid, Connected Wind Report 25/05/2009

51 Department of Communications, Energy and Natural Resources – All-Island Grid Study, January 2008.

Biofuels as an alternative energy source are rising to prominence as they have the potential to reduce GHG emissions, reduce fossil fuel use and increase security of supply. Currently Ireland has a target of 5.75 per cent biofuels market penetration by 2010, with 10 per cent target by 2020 (as set out in the EU Biofuels Directive). As of January 2008 these aims are being reconsidered in light of environmental and social concerns associated with biofuels such as rising food prices and deforestation. The EU has recently set a 35 per cent GHG benefit threshold for biofuels, a target which may benefit Irish producers because biofuels produced in Ireland will largely meet the new standard.

Improvements projected in current technologies, combined with second generation technologies could result in worldwide production of more than 100 billion gallons of biofuel per year by 2030, representing a significant portion (15 per cent) of the world's motor fuel pool demand and as much as 35 per cent in the United States alone.

Globally, there is renewed interest in nuclear energy as an environmentally sustainable and clean energy source that provides a relatively inexpensive and non-polluting alternative to fossil fuels. Nuclear energy currently provides 80 per cent of need in France and 27 per cent in Germany, notwithstanding safety concerns. Finland has established its fifth nuclear plant with a generation capacity of up to 1,600 MW. Countries, such as France, Germany, the US, China, and India are planning to increase their reliance on nuclear power. In terms of considering nuclear as an option for the future for Ireland, the debate on its relative merits – from societal, environmental, technological and economic perspectives - is still at an early stage. Currently, nuclear energy production is prohibited by statute in Ireland.

The IEA estimates that $26 trillion in real terms will be needed in energy infrastructures worldwide by 2030 to meet projected levels of energy demand, with China alone requiring 17 per cent of the total. Much of the investment will go towards funding refinery, transmission and distribution infrastructures. This increase in global investment in energy infrastructure construction is leading to supply shortages for many critical infrastructure equipment items, driving up capital costs and lengthening plant development lead times. The current credit crisis could delay spending, potentially setting up a supply-crunch that could hamper economic recovery. The cost of transporting coal, LNG and alternative fuels is also expected to rise in the future.

Ireland's energy infrastructure will require further significant upgrading to meet projected future energy demand. In addition to upgrading the electricity grid and installing sufficient interconnectors for natural gas and for electricity transmission, the built environment in Ireland will need upgraded to maximise savings from conservation and energy efficiency. In March 2008 the ESB announced investments of €4 billion in renewable energy projects and €6.5 billion on facilitating renewables including smart metering and smart networks. ESB Networks is to invest €11 billion in the national transmission-distribution networks over the next decade as part of a necessary upgrade to provide for future demand and to facilitate the development of up to 6,000 MW of wind on the island. A key objective of this investment is to enable an increased supply of renewable energy, with some operators such as the ESB itself setting targets to be net zero carbon emitters by 2035 with an objective of reaching a 33 per cent renewables target by 2020 and using clean coal by 2030. (The ESB also plans to generate 150 MW of ocean energy by 2020 – equivalent to 2 per cent of current generating capacity).

A key constraint on the development of the achievement of these targets and on the completion of the ambitious infrastructure investment programme will be public acceptance of the need for major new infrastructure development, including overhead cable deployment, to achieve the targets for renewables set by ESB and others.

Advances in technology will be a major driver of future changes in energy supply options and demand management in Ireland and globally. Renewable energy technology is experiencing record levels of private investment and Ireland too is instituting policies to maximise its competitive position underpinned by modern, safe, and clean energy infrastructure.

Summary

Global energy demand is set to continue to grow strongly over the next two decades, as it will in Ireland. Peak oil will pose a particular challenge for Ireland given our high dependence on oil. Further challenges include how efficiently we can respond in promoting and investing in renewables and sustaining cost competitiveness. Ireland's energy infrastructure will require significant upgrading if it is to meet future energy demand and integrate a range of options into the energy portfolio mix.

2.9 Climate Change

Climate change, defined as "a change in climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods"[52], is now a major focus of policy attention globally.

A watershed was reached in 2007 when globally the findings of the Fourth Assessment of the Intergovernmental Panel on Climate Change (IPCC) were accepted. These unequivocally concluded that climate change is happening and that man is largely responsible. The challenge now facing policy makers everywhere is how best to respond.

The agreements at the United Nations Climate Change Conference in Bali in December 2007 to find a roadmap for the way forward and a global approach to climate change are more positive given the United States' participation. There are indications that the US will agree to join a new international framework, post-Kyoto, in Copenhagen in 2009. China, in 2007, unveiled its first plan to combat climate change that included a commitment to increase energy efficiency by 20 per cent by 2010, and to double the use of renewables by 2020, but did not commit to emissions caps. The challenge for the future is to develop an international framework for emissions reduction that also includes China and India.

While the Kyoto targets are for the period to 2012, the roadmap agreed in Bali points towards more demanding targets. The EU has committed itself unilaterally to a 20 per cent reduction in greenhouse gases by 2020. In the context of a broader international agreement post-Kyoto, the EU is prepared to commit to a 30 per cent reduction. If such an agreement is reached, a target of 30 per cent reduction in GHG would be extremely demanding for Ireland given that Ireland has not yet achieved its Kyoto targets.

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52 As defined by the United Nations Framework Convention on Climate Change.

To combat climate change and maintain eco-systems, the EU has set an indicative target of halving emissions in the long run. Ireland may be required to contribute commensurate reductions to future EU targets.

Ireland's target in relation to the Kyoto Protocol is to limit emissions to 13 per cent above the baseline estimate in the period 2008-2012. Based on the latest inventory figures, Ireland's emissions in 2006 were 25.5 per cent higher than the baseline estimate that underlies Ireland's allowable emissions for the period 2008-2012. While the Environmental Protection Agency has reported that this is down from 27 per cent in 2001, we still have a greater distance to target than many of our EU neighbours.

Furthermore, maintaining rises in global temperatures below 2 ^{o}C may keep the planet manageable, but the UN anticipates that countries will need to prepare for significant impacts of climate change on water supply, agriculture and weather patterns, sea levels, flooding and drought and on animal and plant species.

Foremost among the negative impacts of climate change may be access to water. Precipitation patterns are liable to change as warming and desertification threatens to reduce arable land in many equatorial regions. Even physical topography and international boundaries could be altered if the combined effects of glacial melting, thermal expansion and accelerated ice flows sufficiently raise sea-levels. Anticipated flooding on the basis of current scientific knowledge could impact large areas of the UK and Ireland, and its attendant industry and infrastructure.

The Stern report for the UK Government in 2006 estimated that climate change could shrink the world economy by at least five per cent and as much as 20 per cent under a 'no policy change' scenario. Delay in taking action on climate change would lead both to more climate change and, ultimately, higher mitigation costs.

The response to climate change is likely to be more regulated in the future, based on an approach of joint action among countries. There will be an increasing number of directives, regulations and communications to regulate the EU response to climate change. The inclusion of climate change in the EU Reform Treaty also indicates an important trend. A White Paper on adaptation to climate change is part of the European Commission's work programme. This White Paper is likely to be significant and will address the issue of encouraging member states to 'climate proof' domestic policies and EU support programmes.

There will be a specific attempt to internalise the costs of people's actions to reflect the price they pay for carbon and carbon emitting actions. For example, the European Commission is currently developing a model to assess the external costs of transport. Currently a car user imposes costs on society that are borne by others. The Commission is working to propose a strategy to internalise external costs according to the 'polluter pays' principle. More directives of this type are likely. While the pricing of carbon is one part of the policy mix to influence behaviour regarding climate change, fluctuations in the price of carbon makes the cost of the purchase of carbon credits uncertain.

There will also be a major drive to increase energy efficiency at all levels to combat climate change. An interesting trend is the public attitude to climate change and in particular the specific known threats. In public opinion surveys[53], people generally view the challenges to

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53 Flash Eurobarometer Report 2007 - Attitudes of Europeans towards the issue of Biodiversity.

biodiversity as more important globally than at a national level, for example, viewing the destruction of the coral reefs as more important than of local habitats. It will be important to reverse this trend over the long run so that people understand that local eco-systems are as important as global ecosystems. The television and the Internet are an important source of dissemination of environmental information. The spread of broadband in Ireland and use of the Internet is likely to enhance the understanding of climate change and inform the responses.

The importance of new technologies and innovation to addressing the challenges of climate change is difficult to overstate. Currently available technology, and the technologies expected to be commercialised in the next few decades, could achieve the much needed reductions in GHG. Adopting low emission technology could be a major contributor towards placing the world on a pathway to stabilisation of GHG concentrations.

Summary

Responding to climate change is one of the biggest challenges facing the country. Extremely demanding reductions of GHG emissions have been allocated to Ireland, which will require an all-of government approach and a clear and serious message about change to achieve the 20 per cent reduction target by 2020. The response to climate change will become even more regulated, more EU and internationally driven, giving member states including Ireland less autonomy in their own decisions about climate change. The polluter pays principle will be incorporated into more actions into the future, be it in terms of electricity, transport, heating etc.

The impacts of climate change, be it in terms of flooding, drought or changing weather or agricultural patterns, should be an important aspect of policy development into the future. Because of this immediate and serious response to climate change, many opportunities may also arise for enterprises in Ireland in the areas of environmental and energy related goods and services. It will be important to create the optimal framework conditions and environment for innovation in these and other sectors of the economy to enhance productivity growth and maintain Ireland's competitiveness.

2.10 Natural Resources

Over the next two decades there will be an increasing emphasis on the protection and sustainable use of natural resources. There are communications from the EU on Sustainable Production and Consumption and on Sustainable Industrial Production. This is both a response to climate change and to support the implementation of environmental directives already agreed at EU level.

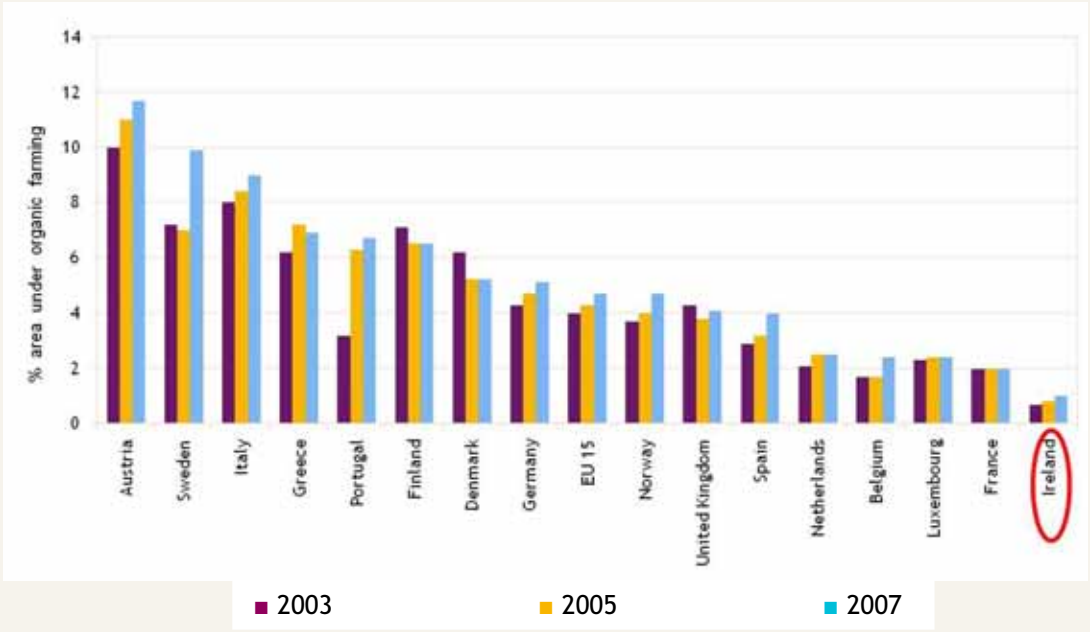
Environmental protection expenditures by governments and businesses will increase. Government expenditure will be forced upwards due to increased regulation from the EU. Business expenditures will increase because of the need to comply with environmental regulation and to acquire a competitive advantage.

The upward price pressures felt in 2008 on agricultural commodities such as wheat, soya, maize and rice is likely to affect more countries in the long term. High prices for many commodities are being caused by a multiplicity of factors: the needs of the biofuel industry for raw materials, a rising global population, strong demand from developing countries, and

an increased incidence of droughts and floods causing crop failure. If sustained, these high prices are likely to have a more profound affect on developing countries.

Organic farming is on the rise and is likely to continue growing as consumers increasingly demand that retailers display 'food miles' and provide assurances on the quality and origin of food. Ireland has one of the lowest rates of organic farming in EU, at 0.9 per cent of agricultural land compared with an EU average of four per cent (see Figure 22). The total land area involved in organic production totalled 37,466 hectares in 2006 (actual and in conversion), a 26 per cent increase from 29,850 hectares in 2002[54]. Over the same period the number of registered organic producers also increased from 923 to 1,270. A target to reach 5 per cent of land being utilised for organic farming by 2012 was set in the Organic Farming Action Plan 2008-2012[55]

Figure 22: Share of Organic Area in Total Utilised Agricultural Land 2003/07



Source: Eurostat, 2009

Ireland's landmass is not just the approximately 84,000 km sq of the island, but includes an underwater seabed ten times the island's area, approximately 865,000 km sq. This ocean area is largely an untapped resource. Bodies such as the Marine Institute are actively seeking to map and develop its potential in a sustainable manner[56]. A strategic objective of the Government is to maximise the area of the Continental Shelf under Irish jurisdiction and to

54 The National Steering Group for the Organic Sector, various annual reports, Department of Agriculture and Food.

55 Organic Farming Action Plan 2008-2012, Department of Agriculture, Fisheries and Food.

56 Marine Institute, Sea Change – A Marine Knowledge, Research and Innovation Strategy for Ireland 2007 -2013.

establish and delineate its outer limits beyond 200 nautical miles. This would secure Ireland's access to natural resources, by giving exclusive sovereignty to exploit and explore the seabed up to 500 nautical miles from shore. The initiative is ongoing, but the outer limits of the Continental Shelf are being disputed by other countries and any extension will not apply to fishing. If it is extended, there is the possibility of oil and gas finds.

The high price of oil could render oil and gas exploration more commercially viable off the West coast of Ireland. The impact of the imposition of a tax on the exploration companies will be minimal, given the price of oil. As the price of gas tracks the price of oil, there is opportunity for further gas exploration in the West.

Ireland has 40 per cent of Europe's zinc deposits and 20 per cent of Europe's lead. However, mining will become increasingly difficult and costly as EU environmental directives such as the Mining and Quarrying Directive and the Soil Directive, come into force. In addition, the banning of the use of lead in electrical equipment (RohS Directive) will impact the market for lead in the EU[57].

The total area of land in Ireland designated for protection under wildlife legislation is currently at approximately 11 per cent. The protection of sufficient land area is required if Ireland is to prevent further loss of biodiversity and ensure the recovery of endangered species.

There is an increasing interest in biodiversity and nature by people in general. TV and the Internet are the main sources of information dissemination in regard to the environment, and use of the internet will increase people's interest in the environment, eco-systems and biodiversity will increase. Young people especially are more environmentally aware and as the current generation ages, they may shop and act in a more environmentally friendly manner. This can be seen in the growth in eco-tourism, the fastest growing segment of international tourism, currently estimated to be worth $5 billion globally[58]. The challenge for Ireland is to tap into the growing trend. Environmental awareness, already affecting supply chains and consumer patterns, is forcing suppliers, for example, to reduce food miles and source in an environmentally sustainable manner coupled with non-exploitative production.

There will be an increasing emphasis on preserving indigenous species in the light of threats from alien species such as the zebra mussel and the grey squirrel, and a greater interest in protecting the eco-systems as the habitats for indigenous species. It is forecast that more alien species will be found in Irish waters due to global warming. Our bogs are important economic and environmental resources and as they provide a special eco-system for a range of species it is likely that there will be further special protection for them. There is also a trend to reduce overfishing and to ensure fishing is at sustainable levels, as demonstrated by the EU 2008 Decommissioning Scheme.

57 Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment 2002/95/EC.

58 International Eco-tourism Society.

Reforestation is becoming increasingly important in the context of society's response to climate change and the development of carbon sinks. In 2008 only ten per cent of Irish land was under forest, short of the country's afforestation targets. The National Forest Service estimates that planting needs to reach 20,000 hectares per annum if we are to achieve the 17 per cent forest cover target by 2030.

Summary

Like other elements of a successful economic and social base for the future, the prudent use and protection of domestic natural resources for the Ireland of tomorrow means that hard decisions should be taken today. With rising prices for fossil fuels and increasing demands for energy worldwide, natural resources will be strained out to 2025 in ways never before seen. The challenge for policy makers is to balance the demands of a robust, growing economy with the ability to secure precious resources for use into the future. Governance is critical to this task, on both national and local levels. Environmental policies should weigh carefully the uncertainties of the future, especially in regards to energy supply and security and the accompanying social impacts, not just in Ireland but worldwide. With these challenges also come enormous opportunities for enterprise, with innovation and cutting edge technology advances as vital enablers.

2.11 Conflict

The last two decades have witnessed phenomenal changes in the geopolitical landscape - peace and prosperity in Northern Ireland achieved with the Good Friday Agreement of 1998, the accession of ten former soviet states to the EU since 2004, the successful reunification of Germany, the accession of China to the World Trade Organisation (WTO), the North America Free Trade Agreement, the emergence of the Association of South Eastern Asian Nations (ASEAN) as a forum for dialogue in the Asia-Pacific region. All of these point to the pace of progressive change. Yet the menace of conflict on political, economic and religious grounds remains across the globe, particularly in the Middle East and Africa, and the democratic model is under continuous pressure in many parts of the world.

There are a many factors likely to contribute to increased fragmentation in the future, including:

- Income differentials and an increasing Gini Coefficient
- The effects of climate change and natural disasters
- Religious conflict
- Shifting family structures
- A widening gender gap
- Mobility differentials
- Food shortages
- Increased nationalism
- Health scares such as the threat of pandemics
- Decreased community spirit

- Access to natural resources, especially potable water and fuel sources
- Growing power of multi-national corporations
- Access to services and the digital divide
- Fall of the middle class
- Cultural differences
- Changing global political environment
- Increased burden on developing countries

The rise of economies in BRIC countries (Brazil, Russia, India, and China) is forecast to bring major changes to the world economy by 2030. Increased affluence and population levels in China and India will consume more and more natural resources and fuel supplies, and will account for two-thirds of the world's food demand.

Particularly outside Western Europe, in many countries politics is increasingly focusing on cultural issues including religious belief. By 2025 the number of Christians is projected to increase from 2.2 billion in 2005 to 2.7 billion. The Muslim population will increase from 1.4 billion to 1.9 billion and the number of Hindus from 0.9 billion to 1.1 billion. Religious traditions are likely to have a growing influence on constitutional issues in many developing countries and impact on social and ethical issues such as cloning and environmental protection in developed economies.

One of the major potential sources of future conflict is likely to be access to natural resources and supply shortages resulting from climate change. The expected effects from climate change, including increased flooding and temperature increases, will give rise to severe knock-on effects in the future. For example, the number of people at risk from flooding in Africa in 2080 is predicted to be 70 times greater than today's risk[59], a potential cause of conflict over water resources. Food scarcity will also rise as a result of global warming, causing greater conflict over access to food supplies[60].

Conflict over natural resources, including rights to exploitation of resources in protected habitats, is likely to increase as fossil fuels reserves deplete. Nuclear proliferation, brought on first by increased use of nuclear power for electricity generation, may also give rise to increased fears of nuclear disaster and rising divides between governments over nuclear capabilities[61].

Advancements in technology will have the potential to reduce digital divides or to further widen existing gaps. The proliferation of mobile technologies and affordable and more widely available computers in developing countries offers the potential for rapid catch-up. However, availability and access to technologies is only a first step.

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59 United National Framework Convention on Climate Change (UNFCCC) (2007), *Report on the African Regional Workshop on Adaptation.*

60 Marg, Shastri, DP, Indian Council of Agriculture Research (2007), *Climate Change and Indian Agriculture*, Proceeds: National Conference, Climate Change and Indian Agriculture, New Delhi.

61 UN News Centre (2007), *UN Pushes Ahead with Multinational Enrichment Plan to Prevent Nuclear Proliferation.* Available at: http://www.un.org/apps/news/story.asp?NewsID=21978&Cr=nuclear&Cr1=

As a number of studies reveal that future societies may be even more fragmented along the lines of education rather than income, there will be a need to develop human capital to ensure the optimal exploitation of technologies[62]. Increased 'virtual' access will lead to the creation of new communities, which can be either positive or destructive forces for social progress.

Summary

Increasing global prosperity is likely to continue to be accompanied by the prospect of conflict and division. Access and ownership of scarce resources, particularly in developing countries are likely to acerbate conflict. Among developed economies, the prospects remain positive for progressive multilateral engagements to address global challenges and pursue national interests. The re-emergence of multi-polar power points in the US, EU, ASEAN, Middle East and BRIC countries could serve to increase the importance of such multilateral engagements over the longer-term.

To play a role in reducing international conflict in the future, Ireland will need to present a strong moral basis for leadership. By addressing national issues, such as the widening social divide within its own borders, tackling the issues of immigration and racism, and increasing good governance, Ireland can position itself as a force for peace and stability into the future.

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62 Robinson, John P., Paul Dimaggio, and Eszter Hargiitta (2003), *New Social Survey Perspectives on the Digital Divide*, IT & Society (web journal), Issue 1, Volume 5.

3. A Foundation for Integrated Policy Development

This section discusses the process of scenario development, the scenarios themselves and the key crosscutting messages and overarching principles arising from them. Combined with Section 2, these lay the foundation for formulating the main output of this report, namely the strategic policy requirements for Ireland as detailed in Section 4.

It is important that Ireland learns from the recent turmoil in financial markets and the global economic recession and also adapts robust strategies to prepare Ireland for future challenges and uncertainties. The forces of change discussed in Section 2 will strongly impact upon the shape, possibilities and nature of Ireland until 2025.

Complicating any action to plan for the future is the possibility that some of the forces of change and drivers may not persist, or may themselves change in scope, scale and impact. There is also the possibility that sudden disruptions or major disasters may occur. To take these possibilities into account, an examination of the forces of change by the *Sharing Our Future* working group identified four critical uncertainties for Ireland to 2025. These are:

- Energy supply and security
- Globalisation
- Social values and systems
- Climate change

The study recognised each of these as major determinants of change, unpredictable key variables capable of strongly affecting the world and Ireland's place in it. They are largely outside the control of national governments, yet any one could take an extreme value that could confront Ireland with major economic, social and security difficulties.

In this context the *Shaping Our Future* research undertook a further stage of analysis that scrutinised the implications of where these critical uncertainties could take Ireland. Accordingly, and using different combinations of extreme values for the critical uncertainties, the study elaborated **four socio-economic scenarios** that envisioned a full range of possibilities for the future. The scenario characteristics can be found at Appendix 3.

Scenario planning is different from forecasting. Forecasting tries to predict the future quantitatively, focusing on certainty and the projections of current trends, while scenarios are used to represent a range of possibilities. The main outcome from the scenario building and analysis process was the development of a cluster of key crosscutting messages and a set of overarching principles. These were synthesised and distilled from the range of futures envisioned for Ireland in a global context. Together with the forces of change discussed in Section 2, the crosscutting messages and overarching principles are the foundation from which the strategic policy requirements for Ireland are drawn.

The immediate outcomes that emerged from the process of defining and elaborating the four scenarios illustrated that:

- Disastrous discontinuities such as pandemics and floods are well within the range of possibilities for Ireland;
- Whatever change confronts the country between now and 2025 it is likely to be major and far-reaching; and
- Preparations will have to begin soon.

3.1 Key Crosscutting Messages

A number of key messages emerged from the scenarios process and are as follows:

- The need to ensure we develop a more sustainable economic base for employment and wealth creation in the country;
- The need for a more sustainable path for the public finances;
- The need for a prioritisation of capital development and investment with greater efficiency in delivery; and
- The need for a whole-of-government longer-term approach to matching the objectives of competitiveness, energy and climate change policy.

These are discussed below in further detail.

The Economy

The Irish economy will continue to prosper as an open, innovative and competitive economy in an open, international environment to 2025. Even in a more protectionist world, the decision to remain open to international trade, investment, talent and technology flows will pay dividends.

Alongside a growing base of indigenous global players, FDI will remain a significant force in Ireland's economy. Competition for funds and investment will be very high but increasingly Irish skills and strong differentiated marketing will be essential success factors in targeting corporate and individual inward investment. China, as one of the key global investors, will be a major source of corporate investment in Ireland alongside the US, which will remain an important FDI source. Ireland will remain a gateway to European markets and an attractive place for international talent to live, work and play.

Ireland will also be a major 'investment ambassador', building on its international negotiation and mediation skills, helping to develop and smooth the way between different cultures (both corporate and national) to encourage effective bilateral trade, investment and joint ventures.

Enterprise Structure

The enterprise structure will continue to evolve to 2025, with a mix of large and small innovation-intensive companies, indigenous and multinational. Leading services enterprises will operate from Ireland and contribute over 80 per cent of the country's foreign earnings. Small businesses and self-employment will flourish to take advantage of local opportunities. Significant levels of entrepreneurship will have emerged and specialist skills and resources will be important in the development of enterprises.

Lifestyle entrepreneurship and self-employment will also flourish as people decide to be more in control of their own destinies. Personalised services for the time-poor will grow; 24/7 operations will be commonplace, facilitated by virtual and flexible working. Maximising efficiency and using resources effectively will be a driver in more flexible self-employment for many.

Virtual companies will flourish, enabling new alliances and more global operations even from a small home market. Companies will be more flexible, able to form, re-form, and create alliances with greater ease. Remote cross-border collaboration, within teams, across companies and between companies will be commonplace. Failure will be recognised as part of success, increasing entrepreneurship levels.

New services sectors, in particular finance, information and professional services will continue to flourish and developments in nanotechnology, biotechnology and ICT will underpin the emergence of sectors such as health and bio-informatics, high-tech functional foods and clothing. Climate change challenges will provide Ireland with many opportunities in the environmental goods and services sector. There will also be opportunities in high-tech business service areas managing complex systems and providing specialist support to overseas multinationals.

Innovation Levels

Innovation and creativity in all its dimensions will continue as the central driver of wealth creation, economic progress and prosperity out to 2025. Levels of innovation and R&D funding will increase significantly in the coming decades.

Being able to develop as an innovation economy and respond to radically altered circumstances with an appropriate regulatory approach will prove critical to meeting the challenges facing the country and the enterprise base. Collaboration between large and small companies will be key. Small companies will often find solutions and then work with larger enterprises to produce the quantities of product or services required.

Approaches to research and innovation will tend to be more open to collaboration and multidisciplinarity, with boundaries between various disciplines blurring in areas such as the development of super-nutraceuticals. Across a wide number of scientific disciplines biotechnology will underpin technology in many developments and advancements.

High costs, be they energy, environment, transport or food, will force innovation in many areas and provide many opportunities for business. There will be high levels of entrepreneurial activity driven by the acceptance of failure as part of success, coupled with easier access to start-up funding. Virtual worlds will be commonplace. People will live in smart homes, wear smart clothing and use a range of smart products supported by advances in technology.

Skills and Education Base

By 2025 Ireland will have moved to a higher value, higher productivity economy with an innovative skills base to support its advancement.

Participation and investment in third- and fourth-level education will increase further as part of lifelong learning and retraining and for providing the skills needed for an increasingly complex economy. International institutions will compete for students worldwide.

The emphasis on self-reliance, competition in the job market, and the need to adapt to new circumstances will force many to recognise the need to retrain, improve skills and become self-employed. Individual responsibility for skill development with lifelong learning will be common, with many engaged in remote access courses and online learning.

Education and training provision overall may become more fragmented, with greater flexibility and responsiveness to the needs of both the individual and the market. Personalised learning plans and programmes will provide highly targeted and tailored education support. Many programmes will be delivered online, and this will begin to undermine softer social skills development. There will be an increase in private education to meet demand for specialist skills and resources.

The need for language learning reduces with the advent of simultaneous and accurate translation, while the personal, softer aspects of 'cultural translation' will be a speciality for Ireland. With the emphasis on developing innovation skills for an enterprise economy, teaching will have undergone something of a change of status by 2025. It will be a highly paid, but also a very flexible profession characterised by high levels of continuous professional development.

ICT Advances

Advances in information and communication technologies will continue as key factors in productivity growth, globalisation of trade, particularly of services, and the emergence of new business models that change the way businesses and people relate to each other.

ICTs will be fundamental enablers for the development of the economy as a whole. ICTs will be an essential underpinning infrastructure (specifically next generation networks in future markets), services, skills, enterprise and economic development. ICTs will also create significant business opportunities within the sector itself, achieving very high levels of investment and effective utilisation.

Widespread installation of ICTs, ambient intelligence, location-based services and a convergence of ICTs will proliferate, with advances in life sciences impacting health management, longevity and quality of life. The increasing virtualisation and remote provision of services such as healthcare, education and leisure will improve the efficiency of and access to services, as well as underpinning the growth in virtual offices and virtualised work systems.

Real-time information and real-time carbon monitoring will be common. The mobile phone will become an all-purpose multifunctional device replacing the many electronic cards and devices used in the earlier part of the twenty-first century. Embedded intelligence will be in many aspects of life, from transport through to interactive functions in the home. The effectiveness of electronic communications will be increasingly important to participation in society and to economic success.

In cases of emergency such as extreme flooding events or a pandemic outbreak, ICT networks will be a top priority in underpinning the economy as a whole, particularly the online economy, and in communicating on a global scale. Critical infrastructures such as ICT will be flood-proofed and there will also be a move to wireless networks.

Energy Investment and Costs

Efficient investment in energy infrastructure is likely to be more important over the next two decades and there will be a flexible and dynamic supply-distribution system in operation by 2025. Energy prices will be much higher in real terms, making alternative energy technologies and approaches more cost effective.

Oil peaking will be a key underlying factor that results in high energy prices. There will still be a reliance on fossil fuels as an energy source for electricity generation and transport and security of supply and geopolitical stability issues will be of even more concern than today. Growth in nuclear energy will continue across Europe.

High energy costs and tighter environmental regulations will spur innovation in environmental technologies, from which Ireland will benefit greatly by being both a user and a licensor of technologies and being more energy secure itself. Distributed micro-generation (small-scale power generation) will thrive. 'Whole-life' costing models for energy applications will be the norm, and there will be much investment in alternative energy sources. Energy efficiency and energy conservation, driven by the need to reduce GHG emissions, will be important features of the energy landscape, with an emphasis on new energy conservation technologies and on reduction of energy transmission loss.

Climate Change Impact and Environmental Policy

The impact of climate change up to 2025 will be felt in many ways. Environmental disasters may become more common, as may environmental migration.

Significant investment in flood defences to protect critical infrastructures and communities are likely to be required, together with changes in population settlement patterns. This will spur innovation in construction design and build.

Water will become a major focus of concern. Water supplies are a cause of conflict and political tension, particularly around shared resources. Because of unpredictable surges and floods the sanitation and security of urban water supplies will be under pressure. Climate change and options for low-energy or less carbon-intensive farming will affect agricultural patterns, resulting in increasing food prices.

The reduction of GHG emissions will be the driving force for many environmental policies to 2025. There will be many demanding international agreements and GHG emission reductions will be achieved by varying amounts.

Tight carbon trading and real-time carbon emission footprint monitoring for travel, transport and energy use will be commonplace. The 'polluter pays' will be universally adopted as an underlying principle of environmental policy. Carbon taxes will be widespread and low carbon incentives will encourage many changes in behaviour. Adaptation policies will be equally important as mitigation policies for climate change responses. Seeing the whole picture — the interrelated nature of the world economy and its full links to climate change — will be key to reducing GHG emissions.

Transport Infrastructures

By 2025 there will have been substantial investment nationally and regionally under the NDP 2006-13 and subsequent plans, resulting in significant upgrading of all forms of infrastructures.

This will involve both public and private investment, with many systems and services run by local companies in local communities. Public transport in all cases will be more like private transport, providing flexible, on-demand, pay-as-you-go services with differentiated pricing models to reflect time, distance, level of flexibility, speed and carbon emissions. Public transport will be highly efficient. All forms will operate at full capacity for each journey and provide regular high speed links on a national, regional and local basis.

Reduction in GHG emissions and congestion will be key driving forces for the many developments in the transport sector. Carbon taxes and widespread carbon usage information and monitoring, low carbon incentives and intelligent transport systems will encourage major changes in travel patterns. There will be a move from private to public systems and more regional and less international travel. Air travel will be increasingly seen as a luxury. Pay-as-you-go systems will be commonplace in an effort to reduce GHG emissions. Freight transport will move away from air to sea, providing opportunities for deep water ports, ship building and repair.

Oil and gas will be valuable and expensive commodities with supply still unreliable. Urban transport will be electric-based and the hydrocarbon engine will not yet have been replaced for private transport, but there will be a significant shift away from private car use.

Because of remote access, flexible working and virtual working patterns commuting times will be significantly reduced, relieving some transport pressures.

Regional Development

The role of the regions will be an important part of Ireland's economic success out to 2025. The regions will be very well linked in terms of transport and technological connectivity, which in turn will encourage regional growth centres and self-monitoring development.

Virtual and remote working patterns will also encourage growth in the regions. Regional and local tourism will thrive because of improved resources and Ireland's cooler climate.

Many communities will be more physically and geographically concentrated, sharing resources and energy supplies more effectively. There will be significant investment in flood defences in combating the effects of climate change although some low lying areas could be in danger.

Social Change

Ireland will have a greater proportion of elderly people in the population by 2025 and life expectancy will have increased. Care for the elderly will become an even greater concern than at present with provision for an older population falling on families, increasing financial pressures on them.

Healthcare costs will increase and personalised genetic-based care will proliferate. The delivery mechanisms for this kind of healthcare range from an international telemedicine market to provision in regional hubs.

Communities will tend to be more physically and geographically concentrated and there will be attendant potential for growing localism and an emphasis on self-reliance and on using local resources such as energy, food and leisure to best effect. Societies will tend to become more intolerant and more stratified, with a sharper division between rich and poor. Electronic, online and virtual worlds will play a major part in socialising and in leisure pursuits, creating new modes of interaction but displacing old ones.

The work-life balance will improve for many. Working from home will be common, supported by an advanced ICT infrastructure, leading to isolation for some. In spite of the increase in working from home, childcare provision will increase, enabling citizens to balance work with wider care and family responsibilities for children and elders.

With the exception of a pandemic type situation in which the country's borders are physically closed, Ireland will still have a relatively open policy to skills based economic immigration. Reducing tensions and increasing acceptance and integration of immigrants and their families will be a recurring theme. Significant levels of immigration will still be needed to meet critical skill requirements, but competition from other countries for migrants is high, especially for key skills.

Effective Governance

By 2025 strong governance will bring about real change in approaches to the key challenges of harnessing the full potential of the globalisation and technological changes that improve prosperity and address climate change. There will be tough choices and decisions at every level.

There will be in general a greater willingness to collaborate on an international scale on key monetary, environmental and regulatory issues. EU membership will expand further. The EU's external influence internationally will depend on its ability to manage internal tensions or disagreements and how it copes with being one among many economic giants. The EU and other international bodies will play vital roles in providing security, managing essential supplies and coordinating responses to a global crisis such as a pandemic. Many of the wider policy initiatives for combating climate change, conserving energy or fundamentally changing the nature of public transport will rely on effective governance at every level from local to international.

There will be a question mark over the effectiveness of international governance in addressing the key challenges facing the world, with businesses involved in providing leadership, developing more socially orientated policies and governance.

Issue- and value-based politics and protests may increase, with a potential increased role for NGOs and greater societal participation in decision making through online mechanisms or indeed global voting systems.

3.2 Overarching Principles

Planning for the future will necessitate policy decisions that need to be taken now and that will have an impact into the future. Foundations for long-term policy can be found in the Government's medium-term programme *Building Irelands Smart Economy* and the challenge is to further develop wide and longer-term strategies to respond to all the issues identified for Ireland up to 2025 and beyond.

In tandem with the key crosscutting messages distilled from the scenario planning process, this research has led to the identification of a set of overarching principles to guide policy decisions. These principles fall under three main headings: vision and leadership, the management of complexity, and the quality of life.

Vision and Leadership Are Key

The magnitude and scope of the changes facing the country into the future are significant, as are the required policy responses. The changes need to be defined and prepared for as the resources required are large and the responses required (both from institutions and individuals) are considerable. Planning needs to start now.

- Firstly, managing existing pressures needs to be balanced with the need to prepare for future challenges with an elaborated vision of how Ireland can potentially develop. This report has set a vision for Ireland of achieving greater prosperity and full employment, social justice and equity, security, liberty and well-being underpinned by a competitive, sustainable enterprise sector. Enterprise is at the heart of the economic recovery process.
- Secondly, vision and leadership will be necessary in making difficult choices. A longer-term perspective is needed to prioritise and to invest in areas such as education, R&D, infrastructure, transport and provision for pensions, and prioritisation has to be explicit in terms of resources and time-periods. True prioritisation will require choices to be made in terms of expenditures and sequencing, and it may have to be accompanied by significant regulatory and institutional change.
- Thirdly, there is a need for immediacy: even though the changes required are long-term, the work to bring them about has to begin now, because of the time needed for changes. For example, time will be needed to restore long-term sustainability to the public finances and for investment decisions in infrastructure for new public transport systems or in education systems to take effect.

Complexity and Uncertainty Should Be Managed

The complexity of managing the national economy and the level of integration of the world economy is increasing. Issues and policy areas that in the past could be regarded as separate are increasingly intertwined, such as energy, climate change, spatial planning and transport. The issues are complex. Finding integrated responses to deal with these interrelated issues and the right tools to implement them effectively will be a difficult task. The continued pace of globalisation will mean increasing specialisation, more complex supply chains, and more flexible production and logistics systems. The re-regulation of financial markets will accelerate these trends and may make it more difficult to determine the immediate effects of changes in the supply of key goods and services from different parts of the world. This uncertainty will be compounded by the continuing tendencies towards global political tensions and regional instabilities.

The complexity of the world economy in the future will provide a very demanding context in which to make national decisions and will require more sophisticated responses and timely repriorisation.

This in turn will mean that governance itself will need to change. Effective government policy making and associated regulation will be critical for future success. Clearer rules will be needed in more confused times. Quicker and better decisions will also be needed, with quality processes that are sufficiently open and transparent enough to ensure assent and support. With the growing importance of regulation at international level, governments will be required to devote increasing time and resources to these processes, in seeking to influence international rule making to take account of national priorities building coalitions as

necessary, and also in planning to adapt more quickly to the consequences of rule change at international level. As a consequence, the structure of governance itself may need to change over the coming years, including the departmental structures, the relation between national and local government, subsidiarity and devolved decision making, regulatory processes, and the effectiveness of the legal system.

Quality of Life Expectations Will Increase

More rapidly changing work and lifestyles, the pressures from climate change, the possibilities of new technologies and the evolution of new, and sometimes virtual, communities, all point to the importance of quality of life issues. They will be important as a factor in competitiveness, but also as a critical performance indicator for the citizen in his or her interaction with the government.

The importance of quality of life and well-being will be increased by longer life expectancies, as well as by the changing attitudes to work, learning and living. The degree to which the national structures can accommodate that flexibility and increasing mobility will be a measure of how far the economy is meeting the needs of a changing business world, but will also be a measure of how far society as a whole is meeting the growing requirement of individuals for choice.

Governments will be expected to provide more security in a less secure world, and a range of services in the social, health and safety, and environmental fields that go beyond the range offered at present. The role of the State as provider and/or regulator of quality of provision of key services by the private sector will need to be addressed.

4. Strategic Policy Requirements for Ireland

Based on the quantitative projections of Section 2 and the qualitative findings in Section 3, this section identifies ten priority policy areas for ensuring a competitive and sustainable Irish enterprise sector out to 2025.

Enterprise policy in Ireland is targeted towards creating stable levels of economic growth to allow achievement of personal and social objectives. Successful enterprise provides the essential resources for health, education, infrastructure and the environment, allowing us to build a fair and equitable society. Enterprise therefore needs to remain at the heart of national economic policy supported by a truly integrated, coherent policy framework, one in which all of the relevant economic and social aspects of policy interact in an optimal way.

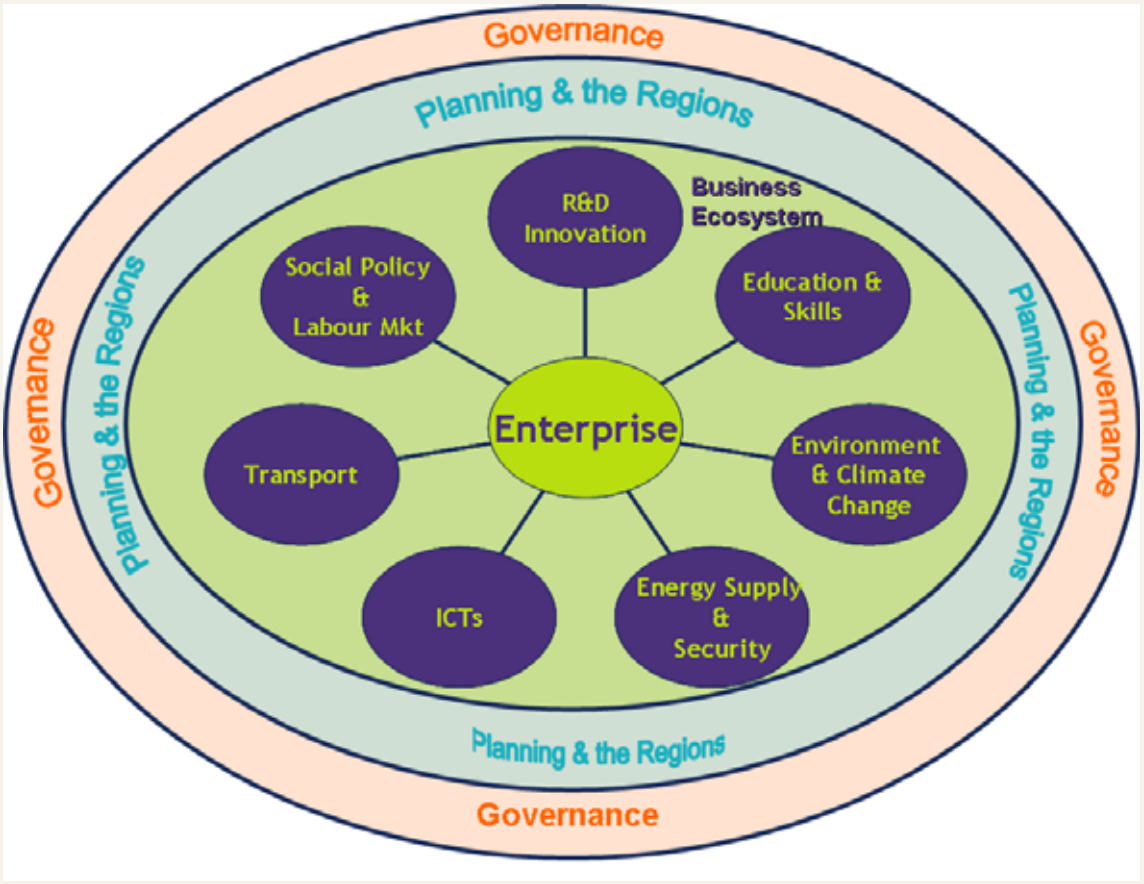
In this context a number of implications emerge from the scenario building process on the long-term future of enterprise in Ireland. One of the aims of this report is to help policy makers use futures thinking to improve policy, planning and decision making over the long-term. The options presented seek to address a number of challenges that have emerged from the scenario building process including:

- Managing the potential conflicts between economic policy, environmental concerns and resource prioritisation issues;
- Connecting policy and decision makers more effectively at different levels from the local to national to global; and,
- Strategically planning our spatial development and prioritising investment decisions and expenditure.

The following sections address these issues and set out the strategic policy requirements for Ireland to build a sustainable and competitive enterprise sector in 2025. They will also support the rebalancing of the economy towards export-led growth and recovery from the dependence on domestic demand and construction of recent years.

The findings are presented within the following business framework model identifying ten policy areas that would have the greatest impact on ensuring a competitive, sustainable enterprise sector in 2025 as illustrated in Figure 23.

Figure 23: Policy Areas Important to Enterprise Development



The key objective of all policy and strategy guiding enterprise development in Ireland is to continue successful economic and social development, increase prosperity and maintain the country's competitive position, with a focus on both the indigenous and multinational enterprise base.

While considering the strategic policy requirements in this section there is a need to take into account the resources that are available, including exchequer funds. The relative ease with which competing demands for public spending and for moderate taxation have been resolved in recent years may not continue over the period to 2025. There is likely to be a renewed need for choices to be made about the level of the tax take, the structure of taxation, the scope of public goods provided by the Government and the scope and form of welfare provision. Prioritisation of expenditure will be necessary and Ireland will need buoyant revenues to support the strategic policy requirements discussed here. It is also important to take into account that the nation's economic policy levers are limited, and that influencing the country's future prosperity will in turn become ever more dependent on Ireland's ability to influence policy decisions at an international level in areas such as energy and the environment.

Having sought to address the immediate problems in the financial sector and in the public finances in the April 2009 Supplementary Budget, Government policy is also focused on the medium-term, especially through the implementation of the Smart Economy programme, which is intended to ensure that Ireland is well placed to participate in a global upturn.

Clearly, in meeting these and longer-term future challenges major policy choices will have to be made. In making these choices, it will be important to recognise that trade-offs exist and accordingly, an appropriate and timely policy mix needs to be developed in this light.

While the basis for the development of the following strategic policy requirements is The Forces of Change to 2025 (Section 2), combined with the key crosscutting messages and overarching principles (Section 3), it is acknowledged that there are a number of current initiatives of strategic importance in place that will assist in reaching the vision of a competitive, sustainable enterprise sector in 2025. Nevertheless, additional steps will also need to be taken.

The ten priority policy areas discussed are as follows:

- The Enterprise Sector
- Education and Skills
- Innovation and Research
- Information and Communications Technologies (ICTs)
- Energy Supply and Security
- Environment and Climate Change
- Transport
- Social Policy and Quality of Life
- Planning and the Regions
- Governance

4.1 The Enterprise Sector: Strategic Policy Requirements

4.1.1 A Longer-Term Enterprise Strategy: Building Ireland's Competitive Advantage

It is important to build on existing strategies to support enterprise, incorporating a long-term planning approach to enterprise development, but ensuring that current enterprise strategies are appropriate to the future enterprise base.

Recent policy objectives and strategies guiding enterprise development in Ireland include:

- The Enterprise Strategy Group (ESG) report Ahead of the Curve, Ireland's Place in the Global Economy;
- Enterprise Ireland's Strategy 2008-2010;
- IDA foreign direct investment strategy;
- Strategy for Science, Technology and Innovation, 2006-2013;
- National Skills Strategy;

- Report of the Manufacturing Group, published in April 2008;
- Services Strategy Group Report;
- National Development Plan 2007-2013, and;
- Building Ireland's Smart Economy : A Framework for Sustainable Economic Renewal.

Among future priorities are skills and human capital development, infrastructure and telecommunications, and a supportive and efficient revenue raising and expenditure environment for productivity and economic growth.

In the context of these existing strategies and future priorities there is a need for a long-term strategic outlook to ensure that the needs of the enterprises of the future, where Ireland has or can develop competitive advantages, are provided for.

Continue to focus on building competitive advantage in new and emerging high-productivity sectors, underpinned by a longer-term strategy for addressing the needs of a competitive enterprise sector that will support job creation and growth.

This strategy needs to have clear aims and long-term objectives, together with prioritised supporting action. Existing strategies will need to be reviewed and revised accordingly. Building on the advantages we have in key areas such as life sciences, ICT services, financial services and food and agribusiness will be as important as building new advantages in biomedical, digital media and cleantech. Ireland is also well positioned to harness the potential from convergence between ICT, bio and nano sciences and the critical importance of engineering as an underpinning discipline in all activities.

A shift of emphasis, from knowledge generation to knowledge utilisation and innovation, is also required as part of a strategic long-term view of enterprise development. Analysis and decisions are needed on key questions such as:

- How can Government best work with and support the enterprise sector as it endeavours to increase its innovation and productivity performance over the period to 2025, in light of the changing nature of business, the development of new sectors, and the role of other governments?;
- What are the key business environment conditions that need to be in place or improved for Ireland to be a successful operating base for enterprises in new and emerging sectors into the future, including the technologies that are most important for the long-term strategy for Ireland based on this report's key crosscutting messages?;
- How best can we ensure that public investment and support for research and innovation is attuned to the needs for the economy and society for the future?;
- How can public procurement be used to encourage and support private provision and development?; and
- How best can we respond to and support the changing nature of the Irish economy, including the growth in services and how best can we optimise the public and private sectors in the provision of essential goods and services?

The developing world's emerging economies and workforces are moving from less advanced, labour intensive activities to more sophisticated, complex and high-tech activities. Emerging economies will ultimately move to offer the world products and services they design, develop and provide. Ireland should aim to be best in class at whatever we do. We need to focus on reinforcing the areas in which we are successful through our approach to education and training. We also need to be open to the emergence and development of new strengths in response to market opportunities and to continue to develop the agility to move out of sunset areas effectively.

The economy has benefited greatly from an openness to change and an ability to develop appropriate, supportive business environments in which new areas of enterprise can flourish and successfully compete from Ireland on world markets. The country has been very adept at harnessing the potential for wealth creation in new areas of opportunity, arising for example from changes in business models, technology, regulation, and trade and financial liberalisation.

Our success in developing a significant presence in areas such as medical technologies, life science manufacturing and financial services, and more recently as a location for high-end ecommerce and corporate R&D, illustrates the potential for capturing new opportunities of well targeted supportive public interventions in areas such as skills and telecommunications.

For the future, we need to continue to recognise that structural change is a natural and continuous feature of economic development and that the pace of change is accelerating. We need to become more adept at anticipating change and in preparing robust responses for the emerging high-productivity sectors. Over the period since 2000 the Irish economy had become overly dependent on construction and domestic demand, which was also impacting negativity on Ireland's current account which went into deficit due to imports relating to both these activities. This structure was unsustainable and Ireland needs to focus again on policy supporting export-led growth.

To achieve strong rates of growth with global economic recovery and to ensure that Ireland remains a highly attractive location for the very best international talent and can provide jobs for those recently made unemployed, there is a need to move even more quickly to an innovation-driven economy, where innovation permeates all aspects of economic and social development and drives productivity growth.

In areas such as ecommerce, information, digital media and corporate R&D, Ireland is still at the early stages of harnessing the full potential of changes in business models to which the Internet is giving rise. So, too, with our growing stature as a location for R&D. The Governments' initiative in investing in a substantial upgrade of our international broadband connectivity through Global Crossing in the late 1990s is paying dividends in terms of our attractiveness for high-skill and high-productivity ICT-related activities and in growing international trade in services. Similarly, investments through the HEA and SFI in research infrastructure and in building excellent research teams are providing the platform for success in attracting leading multinational R&D activities to Ireland, with the number of projects attracted averaging 50 in both 2006 and 2007, a ten-fold increase from the early 2000s.

The food and drinks industries offer further potential for growth, underpinned by scientific and technological developments in production and manufacture and in nutrition. There are also new areas of international trade opening up in which we need to be more adept at capturing opportunities for growth and jobs, including in education services, health delivery

systems and services, intellectual property management and commercialisation, and in environmental and energy goods and services markets.

In addition, Ireland has developed a strong international financial services sector within the country and needs to quickly establish the supportive tax, regulatory, skills and research base that will spur growth to the next stage of development.

There is also a need to deepen our capacities for identifying the niche areas where Ireland has or is developing a deep capability, together with the policy requirements to reinforce that success. Targeted industries will increasingly be high added value with a low labour input, and be knowledge and service intensive with a high level of customisation in niche markets.

Building on current strengths and knowledge in export promotion and in FDI we need to continue to work with the enterprise sector to identify and develop these new opportunities for inward investment, as well as create greater opportunities for outward investment and market development.

4.1.2 Developing Ireland's International Potential

Ireland now has a strong base of internationally trading services firms, from retail and distribution, to development and construction and energy and environment services, with further potential for growth in international markets. Supporting the ambitious management of these companies as they continue to grow their operations internationally will be an increasingly important priority. In light of increased cross border investment and ownership, there is a need to redefine an Irish company as one that is based in Ireland with a global reach in terms of products, services and markets.

In the past, Ireland has built much of its success on its role as a gateway to the European Single Market, and in particular has acted as a bridge for FDI from the United States and as a competitive manufacturing and services base for our UK and other European partners. Ireland's language, business practices and supportive policy environment have all played a part in this role. Economic success has led also to the development of agriculture, food processing, construction, and a variety of services businesses in Ireland that see a global role for themselves.

Develop Ireland as an international trade and investment partner for developed economies and high growth countries and regions.

Ireland's economic model over the past four decades has been heavily driven by an industrial policy that attracted mobile foreign investment into the country through measures such as an attractive skills and fiscal environment, together with a competitive operating environment. These traditional strengths can be built on by recognising that Ireland also has accumulated capabilities in negotiation, in project management, in investment appraisal, in funds management and in tourism services. The potential linkages between different parts of the world should be targeted with services that help those potentials to be realised. The 'gateway to Europe' role can continue but the entrants may be from other parts of the world, not only from Asia but also Latin America.

Similarly the language divide in Africa represents opportunities based on economic integration strategies, professional services, banking, tourism services and construction and can in the longer-term offer new opportunities for Irish enterprise, provided that preparation occurs, in particular through greater language skills and better cultural linkages with the target regions.

With the emergence of countries such as India and China and the EU accession states, attracting FDI is becoming increasingly competitive. This is a big challenge facing the Irish economy into the future. To remain competitive and continue to attract FDI there is a need to actively seek out the new and emerging markets and to work with emerging global MNCs to explore their future needs and the potential role for Ireland as a partner in their innovation processes and in serving global markets.

There is also a clear need to continue to deepen our links with the US and our main European trading and investment partners, while also developing long lasting relationships and business contacts with China, India and the Middle East to take advantage of opportunities for efficient sourcing and their importance as emerging hubs of innovation and future sources of FDI.

4.1.3 Integrating Enterprise Support

As recognised above, the State through providing a supportive policy environment and through the actions of a range of government departments and agencies is an important and active partner in the enterprise development process. This is a dynamic process of interaction and mutual support that takes place against a backdrop of dramatic change in the international environment. Enterprise Ireland is working with firms whether start-ups or scaling, in traditional or emerging sectors, in helping them improve their productivity, exports and access to finance. IDA Ireland, while continuing to attract investment to Ireland, is also working closely with firms to re-position their Irish operations and increase productivity and competitiveness. In this context it is essential that there is coherence and consistency in the approach and commitment to enterprise development requirements at all levels.

Create and maintain an integrated approach across the State sector to support enterprise productivity and growth.

To support and encourage the development of enterprises there is a need for coherence across the full range of agencies that actively work with them. These agencies, some noted above, include Enterprise Ireland, FÁS, IDA and SFI. Also important are sector specific bodies that either have an enterprise development remit or which impact on the investment decisions of firms. These include Bord Bia, Sustainable Energy Ireland, Fáilte Ireland and sectoral regulatory bodies in areas such as communications, the environment and energy. Each organisation is increasingly dependent on the actions of others to ensure that their objectives and their client firms' objectives can be achieved.

New mechanisms and working arrangements will be increasingly required to ensure that State support for enterprise is optimised and that a pro-competitive enterprise perspective pervades all organisational approaches into the future. For example, public procurement provides a major opportunity for Ireland to advance its highest priority policy goals and to

achieve the twin objectives of a R&D driven innovative and competitive economy on the one hand and first-class public services for citizens on the other. Realising this opportunity requires both high-level political commitment and detailed changes of practice within the procurement community.

Public procurement can play a role in the development of key technologies and drive innovation by:

- Prioritising the areas that are critical for both development and application of technology from elsewhere;
- Identifying current best available technologies and applying them now;
- Improving the skills and knowledge of 'customers' in the public sector in identifying, managing and applying innovations;
- Moving to an outcome-oriented approach of accountability to reduce tendencies of micro management and allowing greater flexibility and risk taking-better risk management and increased devolution of decision making;
- Incentivising lined up, collaborative and cross departmental thinking and initiatives;
- Developing 'test bed' trials of new approaches; and
- Educating the public sector on the benefits of and need for innovation.

Coordinated actions to develop conducive environments for particular sectors will also be increasingly important. Some of the key areas in which integrated action could pay dividends are the financial and education services, health and medical technologies and digital media.

In many other areas, Irish enterprise is well positioned to continue growing in niches targeted for development over recent years: life sciences, health-related manufacturing, financial services and ICTs. However, it will be the addition of integrated actions that ensures Ireland has the required skills, research bases and regulatory environments conducive to innovation fit for the future.

4.2 Education and Skills: Strategic Policy Requirements

As well as being a central enabler of an inclusive and successful society education is central to enterprise development. To sustain higher incomes Ireland needs to ensure that it can create a unique competitive advantage in terms of the education and skills of its citizens. Ireland is increasingly competing in the global market for talent. Those with high skills will choose environments that offer rewarding employment, continuous development opportunities and high quality of life. Achieving the greatest possible depth and quality in our education and training systems will be central to remaining competitive into the future.

The Government has undertaken a range of policy reviews in respect of education and training systems development over recent years, most recently the review of higher education initiated in early 2009.Through initiatives such as the development of a higher education strategy, the ICT strategy for schools and the tackling of educational disadvantage through the life-cycle approach the Department of Education and Science (DES) are working towards the adoption of an integrated approach to education and training policy and delivery.

The most recent and significant commitment to the development of a 'fourth-level' postgraduate education stream, with the ambition to be of a standard comparable to the best in the world, the reform of the lower secondary curriculum, the introduction of teaching of science at primary level and the establishment of pre-primary schooling are particularly important recent initiatives.

Additional strategic policy requirements, as outlined below, need to be considered. The National Skills Strategy, produced by the Expert Group on Future Skills Needs[63], provides a framework for skills development in Ireland out to 2020 from pre-school upwards. It recognises the importance of a highly skilled, well-educated population that will drive productivity, innovation and entrepreneurship and will increase living standards for all. The Skills Strategy proposes a vision of Ireland in 2020 in which a well-educated and highly skilled population contributes to a competitive, innovation-driven, knowledge-based, participative and inclusive economy. If this vision is achieved it will enhance Ireland's competitiveness advantage both economically and socially.

The key immediate challenge is how best the education system can assist those who lost their jobs in the recession, particularly those employed in construction. Providing alternative skills for many of those who opted out of third level for jobs in construction is a key area for higher education institutions to address over the coming years, with both undergraduate, conversion and postgraduate courses.

In terms of moving existing firms (both indigenous and multinational) up the value chain, a quality education system that is highly flexible, adaptable and responsive to the requirements of enterprise is essential. For example, from 1999 to 2006 the proportion of employees in manufacturing sectors with third-level qualifications increased from 18 per cent to 28 per cent. In financial services there was an increase from 36 per cent to 56 per cent[64]. A highly skilled labour force will continue to be an important competitive advantage for Ireland in attracting FDI and for supporting development in the indigenous base. It is important that the National Skills Strategy be implemented in full and within the shortest timeframe possible.

Develop an integrated approach to education and training policy and delivery.

To meet the future skills needs of Irish society and the economy, a coherent policy approach spanning several government departments is required. Policies should be driven from the needs of the learner and from an economic and social policy perspective rather than supply led. A clear education policy statement is required that clarifies the roles of the various institutions and providers in the delivery of objectives including lifelong learning. Partnership between education and enterprise will also be a crucial element to ensure we continue to provide the skills needed to build a sustainable indigenous enterprise base and continue to attract and retain foreign direct investment.

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63 Tomorrow's Skills: Towards a National Skills Strategy, Expert Group on Future Skills Needs, 2007

64 See Forfas Annual Employment Surveys- various.

Raise education outcomes to the top deciles in OECD countries.

As noted above the types of enterprise in which Ireland will succeed for the foreseeable future will change dramatically. There will be a combined shift to services accounting for up to 70 per cent of exports by 2020, and high value-added manufacturing sectors. This will require maximising existing skills, continuing the inward flow of skills as well as developing new areas of expertise for emerging sectors. Education and training providers have a key role in the development of a fully inclusive labour market alongside integrated, active labour market policies that address those most vulnerable in terms of skills and participation. There is a need also for a more flexible approach to education that enables children and adults to learn effectively and provides a range of face-to-face and online learning options as well as wider support for families with responsibilities for caring for children and elders.

New higher education structures and governance will be needed to reflect the changing nature of funding, the internationalisation of university activities, the key role of third level institutions in contributing to national competitiveness, the need to protect core academic values, and also to respond to the needs of a changing enterprise base and the skills sets it requires. In this regard the Higher Education review initiated in early 2009 by the Department of Education and Science is an important first step in preparing for the future. Issues that should be considered include:

- The need to effectively integrate third and fourth levels and embed the essential links between excellence in teaching and research;
- Resource allocation and priorities, quality of lectures and access to senior academics;
- The targets for postgraduate enhancement and increased PhD numbers, and whether the doubling of numbers is sustainable or consistent with quality requirements; and
- The current model of the university within Ireland.

Encourage the development of the softer skills essential for commerce and innovation, as identified in the National Skills Strategy.

In developing tangible professional skills Ireland needs to start earlier – from pre-school onwards – and should develop effective forms of professional updating, as skills can be out of date very quickly. With respect to the physical sciences there is a need to continue to present and 'sell' science and engineering in new ways to encourage uptake, supported by better career options and guidance for people with science and engineering backgrounds, especially women. There should be recognition in policy development that new skills and industries, opportunities and needs are emerging as enterprises restructure and the sectoral balance changes towards a more sustainable structure of export-orientated enterprises and employment.

There will be a need for an increasing range of generic skills for individuals to operate successfully within society and the economy. Generic skills that should be included are basic fundamental skills such as technology use, and people-related skills such as communication, interpersonal, team working and customer service skills, as well as conceptual skills such as

collecting and organising information, problem solving, planning, organising, and learning-to-learn skills. Delivering on these outcomes will be a challenge for the education and training systems.

Ireland's success to date in the technology sector has been underpinned by the availability of a young and vibrant workforce. To maintain success Ireland should not only continue to create attractive high-end jobs for the most talented domestic and foreign workforce, but also seek to up-skill the workforce overall and recognise that the role of women in the workforce in general, and especially in technology, needs to be enhanced through changing perceptions of roles and careers and providing appropriate training and opportunity.

At the heart of bringing our education system to the next level and achieving outcomes comparable with leading countries is a need for a stronger focus on teacher quality in terms of attracting the best and brightest graduates into teaching and on the continuous development of those in teaching as advocated in the NCC Statement on Education and Training (March 2009). Teaching should be an attractive and prestigious profession with attractive salaries and good conditions of service, in particular for those at the early stages of their teaching careers.

Science skills at every level of the education system should be further improved. Actions that should be considered include:

- Developing and including communication as part of generic science skills;
- Exploring new ways for developing knowledge and application of scientific method;
- Reconsidering the optimum class sizes and how best to continuously improve teacher quality to provide greater quality of opportunity, develop a wider skill base, and provide more individual time for learning throughout the system; and
- Improving skill retention, especially among women who often leave science and engineering after starting families, by linking career structures with social policies, reviewing existing contracts, and looking at career-work structures to encourage and enable women to return to work.

Develop strategies that support immigrants' education and skill development needs, particularly language skills.

Ireland needs to retain attractiveness for talent from around the world to underpin future enterprise development. The education and training systems need to be able to respond to the challenges that this flow of talent may give rise to. According to recent statistics from the Immigration Council of Ireland, using the skills of the immigrant population to their full potential would increase GDP by two per cent. In this regard, there is a need to better understand why people come and why they stay in Ireland, and to decide what skills are essential and how to target migrants with those skills. There is a need to effectively integrate migrants into the formal education and training system at all levels. Recognition of international qualifications is an important component.

4.3 Innovation and Research: Strategic Policy Requirements

Innovation, creativity and research are central to our economic and social progress. Higher levels of investment in research and innovation are essential, both for enterprise growth, wealth creation and competitiveness, and to develop the products and services in areas such as healthcare and environmental technologies which make tangible improvements to our quality of life.

The factors that contributed to our economic success to date will not be sufficient to achieve this vision. Competition is creating increasing pressure for improvements in efficiency, quality and productivity and the need to innovate.

The Government's Strategy for Science, Technology and Innovation (SSTI), 2006-2013 provides the framework for R&D and innovation actions over the period 2006-2013. It links, in a coherent way, the key government policy areas of education, research and enterprise policies.

The return on the investment being made will be judged on our success over the medium to long-term in restructuring our enterprise base and dramatically increasing sales of innovative products and services from Ireland.

The Government's strategy for economic renewal *Building Ireland's Smart Economy* has identified a range of actions to help Ireland use innovation and research commercialisation to help in the recovery process.

Refresh the national strategy for building an innovation-driven economy and enterprise base.

Decisions made today about investments in science and technology will affect our ability to compete in the global marketplace for generations to come.

A clear national vision and strategy for innovation, enterprise and R&D that recognises and encourages different types of innovation should be developed. This strategy should build on the existing Strategy for Science, Technology and Innovation for the period beyond 2013. A wide definition of innovation should include organisation and business model innovation, workplace innovation, creativity and design. It should also take account of other related policy areas including lifelong learning, regulation and competition policy and electronic communications. It should be flexible and dynamic, taking account of the changing nature of the economy and enterprises.

Policy should also encourage social innovation, which has been a strength in Ireland in the past such as in the delivery of community and voluntary services. A strong emphasis on the application of, as well as the development of, knowledge will also play an important role in the future. The development of a long-term strategy and planning post–SSTI needs to begin now. Such an innovation strategy should include:

- Business model, services, product and process innovation;
- Organisational and workplace innovation;
- Regulation and competition policy;

- Intellectual property management and commercialisation;
- Infrastructure development, specifically NGNs;
- Lifelong learning;
- Public sector innovation;
- Increasing levels of R&D spending beyond the 2.5 percent target in the SSTI for 2013, to much higher levels;
- Strengthening and encouraging public and private spend on R&D;
- Developing better links with and between industries and research to improve the potential for innovation;
- Setting targets to win 'R&D campus' type investment into Ireland;
- Developing visionary targets that can give impetus to research, innovation and investment but avoiding some of the negatives of top-down research agendas;
- Drawing on the lessons and models of R&D programmes in industry where they know what they want to achieve and funds and effort follow; and
- Developing an outcome-oriented approach to allow greater flexibility.

The roles of 'investment' and 'cooperation' need to be carefully considered in an Irish context. To remain competitive in the future global context, investment in R&D will need to be at a higher level than is currently the case, with funding to come from a balance of public and private investment. Suitable cooperative arrangements between companies and countries to ensure access to the necessary technology facilities and infrastructures should be investigated.

Ireland needs an appropriate mix of investment in frontier research, applied research, market development and innovation based on technologies developed elsewhere, as befits one of the most innovative economies in the world. There will be a need to rethink metrics and definitions in response to the changing industry structures away from manufacturing towards greater emphasis on services.

Ethical issues and public perceptions of particular technologies should be fully considered and addressed both at a national and international level if the influence and benefit of technology is to be maximised. This is especially true for medical, bio and nano technologies. For example, public hostility towards genetically modified crops in Europe has had a major negative influence and resulted in Europe becoming relatively underdeveloped in this area.

Optimise research excellence and associated economic impacts to ensure effective use of investment funds.

There is a need for a clear understanding of the links between aims, benefits, outcomes and funding of research between enterprise and universities with stronger more effective links between industry and universities. Critical to the success of the SSTI is the need to ensure optimum translation and absorption of the outputs of this research to the enterprise base to maximise the return of the substantial investment currently being made. For this to be

efficient, the public research agenda needs to be informed by and have relevance to enterprise needs with appropriate mechanisms for enterprise to influence the research agenda.

Ireland will need to increasingly prioritise specific areas of national and industry relevance. National priorities should also be capable of changing to respond to new demands and a changing environment. This means that the focus should not be too narrow: a broad approach to which areas are to be funded should be maintained. It will be vital, under the EU Framework Programmes and the rollout of the SSTI that a dynamic approach is taken to priority setting and the impact this will have on the evolution of national policy. This will be a central challenge for the implementation structures that have been put in place for the strategy and for stakeholders, which include the higher education institutions, enterprise and the public research organisations.

Develop the openness of the enterprise sector and the research base to mutual collaboration.

In a more complex world where the costs of research are increasing and access to new knowledge and expertise from around the world is essential to the innovation process, the concept of open innovation, where there is an opening up of public and private sector innovation activities to external parties, is increasingly the norm. The traditional closed innovation model, where innovation takes place within a single company or research group, is no longer sustainable.

In open innovation systems, firms aim to search for innovations and knowledge also from outside. In the closed innovation model firms suspend the ideas that do not fit their particular portfolio, whereas in the open innovation model they aim to sell or license them for others to capitalize on, while at the same time, seeking seeds for innovation from outside of the firm.

In the near future open innovation may fundamentally transform many familiar drivers of innovation processes, such as the cooperation between universities and companies, intellectual property rights and capital markets. Open innovation also has a tremendous potential to improve the supply and production of public sector and other services through social and organizational innovation.

Government support and encouragement of innovation both in terms of research funding and other support measures should recognise the importance of open innovation and be sufficiently flexible and adaptable to support these actions.

Incorporate food security and the vulnerability of supply in long-term planning.

Food safety and security are set to become much bigger issues at a global level and with volatility food commodity prices, the Irish agri-food industry will continue to be an important part of the national economy and of strategic relevance in terms of food security. The sectoral objectives and priorities in the Government's Strategy for SSTI, 2006-2013 set the basis for future research policy and appropriate levels of publicly funded research need to be

linked to emerging market opportunities and the development of an internationally competitive food and beverage sector for the future.

4.4 Information and Communication Technologies: Strategic Policy Requirements

The successful adoption and effective use of ICTs are important to all types of enterprises, for enhancing productivity, providing new technologies to produce new products and in developing new modes of business organisation. In this context two key policy priorities are the development of Next Generation Networks (NGNs) and services and the more rapid development of egovernment and ebusiness throughout the economy and society.

World-class ICT infrastructure in terms of the availability and speed of broadband is a crucial factor in attracting overseas investment and in developing indigenous enterprise. Ireland has made significant progress on improving our international connectedness. However, Ireland may be at risk of losing its international competitiveness if broadband infrastructure and next generation networks are not further developed as a matter of urgency. Wide penetration of NGNs in Ireland would enable significant new business opportunities, especially in fields such as education, healthcare, and entertainment. The Department of Communications, Energy and Natural Resources (DCENR) launched a consultation paper on NGNs in July 2008 and an action plan and strategy for the development of NGNs in Ireland should be brought forward quickly.

In terms of egovernment, a report of 2008, issued by the Comptroller and Auditor General, highlights that the momentum towards developing egovernment apparent in the early 2000s appears to have faded. Since the beginning of 2006 there has been an absence of a formal egovernment strategy to follow *New Connections*, the second action plan for implementation of the information society in Ireland. From mid 2008 responsibility for egovernment has moved to the Department of Finance and for ICT development to DCENR.

Ensure universal access to high speed, reliable, seamless, wireless and hardwired communication capacity to foster innovation and productivity.

The key crosscutting messages in Section 3 foresee a continuing pervasive impact of developments in ICTs on productivity growth and economic and social well-being in the coming decades. From a public policy perspective, understanding these impacts and developing effective policies to ensure Ireland is at the forefront in exploiting the full potential of advances in ICTs will be essential to future competitiveness and also for ensuring that the country matches other leading ICT adopters. To provide universal high speed systems infrastructure and to ensure that Ireland catches up with EU competitors high levels of investment and effective utilisation of ICTs are necessary.

The 2007 Forfás report, *Ireland's Broadband Performance and Policy Requirements* ranked Ireland 21 out of the 32 benchmarked countries for broadband take-up. Because of Ireland's geography, dispersed population density and above average rural population (40 per cent), a number of areas still have no access to broadband. Accelerating the rollout of the National Broadband Scheme is therefore important in this regard.

But broadband requirements are becoming more demanding. Trends in broadband technology, regulation, market dynamics and applications all point to next generation networks (NGNs) as important to ensuring Ireland's future economic growth. A number of European countries have already recognised this and investment in NGNs that can cater for the services and industries of the future is underway. Further action is required in Ireland to take advantage of the opportunities presented by this technology, in particular through the extension of metropolitan area networks (MANs) to the access layer, the 'last mile', which will provide high capacity broadband to more businesses and homes.

The necessary capacity, embedded intelligence and the real time information systems to support a future integrated, intelligent transport system, tele-services, remote working, and virtualisation of work and leisure need to be in place. It is crucial that the necessary skills among all our citizens at every level and across all ages and educational attainment are provided. Teachers should be trained in the effective use of ICTs in education *per se*, and in applications in the wider world, and their skills should be consistently updated. Although it is essential that the ICT strategy for schools is driven by pedagogical considerations, the levels of ICT equipment and broadband access made available to schools should keep pace with technological advances.

The need to ultimately provide sufficient capacity for the long-term integration of ICTs in all aspects of the economy, public services, care and leisure should be taken into account at the planning stage. This will enable Ireland to compete with the increasing levels of international and global competition resulting from increased virtualisation of work and the economy. Ease of use and reducing the need for upfront training, universal access, and competitive pricing, are fundamental.

Identify the most efficient and innovative funding systems to encourage wide scale access to ICTs.

To develop the infrastructure, and to fund and speed up the rollout of ICTs using current and future technologies, innovative mechanisms and opportunities will need to be identified. Partnerships across government departments could result in cost savings, therefore there is a need for a holistic view of government spending. For example, deployment of the fibre access network off metropolitan networks and more effective use of the high capacity spectrum could be combined with other initiatives such as smart metering for electricity, resulting in an overall cost reduction to the State. In addition, telecommunications ducting on an open access basis should be a mandatory requirement in all national roads developments for both new and upgrading projects.

Other mechanisms that should be considered include using Ireland as a test bed for large-scale trials for the application of innovative uses of new technologies and finding ways to 'piggy back' on wider developments such as the fibre optic investment by Global Crossing. A government investment strategy based on a top-down programme basis, rather than a bottom-up strategy centred on disparate projects, will be essential for future success. A specific transformational role for infrastructure, and acceptance of long-term payback periods for investment will also be needed.

Provide clear and effective regulation of electronic communications to drive innovation and competitiveness and deliver on consumer interests.

Clear and effective regulation will need to be provided that enables maximum market effectiveness and the development and application of ICTs now and into the future, while ensuring privacy and security.

In developing and implementing a new regulatory framework there needs to be clear understanding of the potential of existing and emerging technologies and the relative position of Ireland in terms of their application. A key underpinning factor is the development of the technical expertise and knowledge within Government, its regulatory environment, and in the marketplace. The regulatory framework will require a fast evaluation and response mechanism to enable rapid uptake. It should be sufficiently flexible in incorporating new advances as they are developed. Such regulation should take into consideration the following ICTs developments:

- Roll-out of location-based services using ambient intelligence, pervasive computing, and embedded intelligence;
- Development of intelligent transport systems using global positioning systems and other technologies that manage the flow of people, goods and services, including:
  - Pay-as-you-go systems for transport, insurance etc;
- Technologies for independent living including embedded sensors;
- The growing use of biometrics for health and security purposes;
- Transparency and security of supplies, for example, food security and traceability;
- The management of distribution and freight systems using radio-frequency identification etc;
- Cash-free payment systems;
- Automated and remote shopping systems;
- Remote tele-services; and
- The virtualisation of work.

A systematic analysis of the impacts and benefits of current and future investments in ICTs and other technologies should be included, to enable learning from past mistakes and the adaptation of current and future strategies and regulation to best effect. It is important that current strategies do not hinder future development. A review of current strategies in the light of new strategic objectives should be undertaken.

To achieve an effective and holistic approach to governance and policy making, ICT infrastructure and regulation should be integrated with other targets and policy objectives such as carbon reduction and energy conservation. In this regard, effective regional development, management and leadership will also be crucial.

International ICTs perspectives will also need increasing attention. The role of international standards is likely to increase and Ireland will have little or no voice in the decisions.

Having more policy and commercial involvement in the processes will leave Ireland's innovative enterprises placed for identifying opportunities in the fields in question.

Ensure the integrity of ICT systems to maximise consumer ICT confidence and use.

Privacy, security and fail-safe systems will need to be achieved. As the virtualisation of the economy and remote delivery of services increases, data communication accuracy will become ever more essential as a means of underpinning market and regional development and in reducing the need to travel. The privacy and security measures required include personal control of checks and balances, data accuracy and visibility that recognises the benefits of transparency and trackability and protects against identity theft. In addition, physical security – overcoming weather based disasters or protecting against other external events - is vital. The speed, reliability and consistency of signal and transmission of early warnings will need to be maximised.

Infrastructure planning will need to increasingly take account of the vulnerability to flooding and other natural disasters. To maintain communication and commercial networks, technologies will need to be developed and implemented that provide high levels of flood proofing. Emergency systems and maintenance during times of national crisis will need to be straightforward and require as little travel as possible.

4.5 Energy Supply and Security: Strategic Policy Requirements

To maintain competitiveness and ensure that Irish firms can take advantage of new opportunities in environmental and energy goods and services on global markets, it is important that a reliable, cost competitive energy supply is available. As energy is becoming one of the major drivers of change into the future, it is important that energy policy is formulated with a long-term perspective to ensure that Ireland's needs are met and that the country is positioned as an attractive place to do business. Ireland's future competitiveness and growth is dependent on a secure, reliable and cost competitive, energy supply.

Ireland's geographic location and current heavy reliance on imported fossil fuels (over 90 per cent import dependent) means there is vulnerability to disruptions in physical supplies as well as to increasing prices on world markets. There are a number of critical objectives for achieving a secure and sustainable energy supply for the future of Ireland:

- Ensure diversity of supply, thereby increasing security and reliability;
- Reduce energy consumption and improve energy efficiency;
- Achieve significant reductions in carbon emissions;
- Encourage and drive innovation, R&D and behaviour change;
- Invest efficiently in robust infrastructure for energy generation, transmission, distribution and management; and
- Maintain clarity and transparency in the regulatory framework, but use it also as a policy instrument to achieve progress towards the other objectives.

The *White Paper on Energy*[65] outlines a number of main action points. If implemented in full and within the proposed timeframes, it will go a long way towards providing Irish businesses with a competitively priced, secure and environmentally sustainable supply of energy. But further actions are required and should have a longer-term focus, particularly in the light of timeframe for peak oil and Ireland's high level of reliance of oil as an energy source. Areas that need increased attention include:

- Alternative energy sources, with Ireland maximising its natural resources in a cost effective manner;
- Further development of energy efficiency and conservation mechanisms; and
- Support from a flexible, dynamic grid system that manages both supply and demand.

In housing, transport, and spatial distribution, Ireland has particular patterns and future expectations that will place great strains on energy supply and climate change strategies. The strategic options explored in the sections of this report on transport, the environment and others are therefore interrelated to the options for energy policy.

Develop an overarching national strategy to prepare for the challenge of peak oil.

An overarching national strategy that encompasses energy, transport, enterprise, spatial, environmental and research policy is a requirement for Ireland in the preparation for the challenge of peak oil. Countries such as Sweden have taken the lead by adopting a proactive approach to this challenge.

The main sectors contributing to Ireland's oil dependency are electricity generation and transportation. With regard to electricity generation, the proposed elimination of oil as a fuel source by 2020 is an important first step, and this coupled with increased use of renewables, energy efficiency and conservation actions should increase Ireland's security of supply, provided it is delivered in a way that does not reduce Ireland's relative competitiveness in the long-term.

Regarding transportation, Ireland should undertake a number of initiatives to reduce oil usage in this area by providing alternative modes of transport, especially integrated public transport systems. This will also help in the reduction of GHG emissions. The use of fuel-efficient vehicles including hybrids and use of electric cars should be actively encouraged by Government, including consideration of additional tax reliefs. The Government has recently announced a target of 10 per cent penetration of electric cars by 2020.

65 Delivering a Sustainable Energy Future for Ireland, DCENR, 2007

Develop a range of energy options that will ensure diversity and security of supply and sustain Ireland's competitiveness.

To encourage the diversity and local capacity of supply, Ireland needs to maximise public and private investment in the commercialisation of new technologies, in strategic infrastructure, market arrangements and management.

The recent *All-Island Grid Study* demonstrates that renewable energy penetration levels of up to 42 per cent are technically feasible, with wind being the principal form of renewable generation. The study noted that such an approach, if implemented, would increase security of supply and also reduce CO_2 emissions by 25 per cent. Ireland has expertise in grid stability (the interface between wind energy and the grid system) and this should be further advanced. With respect to other aspects of wind research, Ireland is a technology taker and is likely to continue to be so.

The *Energy White Paper* set a 33 per cent renewable electricity target for 2020. An economic analysis of the implications of this target for the Exchequer and for users should be undertaken to determine how best the target can be achieved without impacting on competitiveness. Wind energy will provide the pivotal contribution to achieving this target.

The '*Ocean Energy in Ireland'* strategy calculates Europe's accessible wave power to be in the order of 320,000 MW, with the highest resource available near the West of Ireland. The total value of the ocean energy market may be €2 billion in 2025 according to estimates by Sustainable Energy Ireland (SEI). The potential for Ireland to become a significant user and perhaps a potential exporter of ocean energy will become clearer over the coming years as the technologies develop. Consideration will need to be given as to how best to interconnect to the pan-European energy market.

The Government's announcement at the Energy Summit in March 2008 of an additional €200 million in energy and environment related R&D through Science Foundation Ireland (SFI) is a welcome initiative. It will complement investment in R&D by other funders in the development of ocean energy technologies and grid stability. Energy storage technology and advanced control systems for demand and supply management are also important areas for future research.

Distributed micro-generation systems should be encouraged for homes, offices and farms etc. to include solar, geothermal and biomass, and in particular the use of waste materials and by-products from any industrial or agricultural process or household waste.

There should be an open debate about the advantages and drawbacks of nuclear energy. Although this is explicitly not part of Ireland's policy preferences at present, advances in technologies and increase in nuclear investments in other developed economies provides an important context for Ireland's electricity options in the next 10-15 years.

Climate change and increasing temperatures will lead to changes in aspects of the weather, including wind patterns, the amount and type of precipitation, and the types and frequency of severe weather events. More sophisticated weather forecasting and modelling will be increasingly important in underpinning the maximum effectiveness and integration of renewable resources and in informing future policy choices.

Ireland needs to further develop the capacity to critically assess these energy supply and security policy options and the inherent trade-offs with respect to environmental costs and impacts, economic costs and the implications for competitiveness over the period to 2025 and 2040.

Develop a flexible, dynamic and efficient supply distribution grid system.

To ensure a secure, reliable, consistent supply of energy there is a need to develop a flexible and dynamic supply-distribution system or Smart Grid. Creating a system-wide, two-way grid to enable the uptake of power from small-scale and micro-generation producers at all levels is an option that should be considered as a mechanism for increasing security of supply.

The smoothing out of peaks and troughs in the energy demand pattern also needs to be addressed. Universal smart metering (in 2008 ESB announced €6.5 billion for smart metering) will help suppliers and customers to work together to manage demand. In the future, more energy-efficient homes will offer the possibility of households selling their surplus energy back to the system.

Develop effective measures to achieve energy efficiency and conservation, the crucial elements in ensuring a secure energy supply and reduced GHG emissions.

Energy efficiency, energy conservation and GHG emissions reductions are essential components of energy supply and security and fundamental in combating climate change. A 'carrot and stick' combination of tax measures and incentives, public and private initiatives, targets and regulations, and progressive pro-innovation public procurement practices will be necessary. To be successful it is vital that the Government leads by example. To attain Ireland's target of a 20 percent reduction in energy demand by 2020, continued and enhanced efforts are required to promote more efficient energy use by business and residential users. The forthcoming national *Energy Efficiency Action Plan* is an important step towards this goal. Smart metering, building regulations and other energy efficiency programmes will also be important in achieving the reduction.

The Government will need to work with industry at all levels, especially those with high energy, high carbon usage, to develop new options and new processes and approaches to initiate change. Using energy related contracts and public procurement to negotiate and explore the possibilities and benefits will be an important component of this work. There is a need to focus on changing attitudes around energy and resource usage and wastage, carbon emissions, etc., as has commenced with the Government's 'Power of One' campaign but moving from awareness to raising to behavioural change initiatives. Clear targets and objectives for energy use and carbon emissions, so that industry and consumers have a clear framework within which to operate, should be set and widely understood. Making energy use and carbon emissions transparent should be an integral part of any strategy. Using differentiated carbon taxes to encourage behaviour change is another option to be actively considered.

4.6 Environment and Climate Change: Strategic Policy Requirements

Climate change is likely to affect Ireland regardless of whether targets are met at the national, EU or global level. The impacts could include serious inclement weather resulting in more regular flooding, and unseasonal weather changes with the potential to disrupt and damage critical infrastructures.

Under the Kyoto agreement, Ireland is committed to limiting the increase of GHG to 13 per cent above its 1990 levels and the target has to be reached during the period 2008-2012. To achieve the necessary reductions the National Climate Change Strategy 2007-2012 sets out a range of measures targeted at the energy, transport, residential, industrial, waste and agriculture sectors.

In January 2008 the European Commission announced its post-Kyoto climate change package. The overall target is for a 20 per cent reduction in GHG emissions compared to 1990 levels and a burden sharing mechanism was proposed. Along with Luxembourg and Denmark, Ireland has been given the most stringent burden sharing target, a 20 per cent reduction. Clearly this is going to provide a great challenge for Ireland. Delivering on the targets and changing behaviours will require government leadership and vision.

To ensure that the competitiveness of the economy is not threatened by the impacts of climate change two sets of initiatives will therefore be needed:

- Mitigation of climate change – reduction in GHG emissions by changing behaviours sufficiently to catch up other EU countries on emission reductions and creation of a clear long-term framework and vision for change; and
- Adaptation for the impacts of climate change – disaster and contingency planning, flood proofing and strategies for longer-term changes to infrastructure and spatial planning.

Many of the issues discussed below are closely tied in with these two initiatives especially in relation to energy security and supply, but they should also be linked in with all related policy and planning areas. While responding to climate change provides a set of challenges for the country as a whole, it also provides many business opportunities in mitigating and adapting to climate change. It is important that Ireland positions itself to take advantage of these opportunities.

Develop a long-term vision and action plan to reduce Ireland's GHG emissions, to mitigate the effects of climate change and sustain national competitiveness.

A clear and serious public message about the need for change to reduce GHG emissions and combat climate change together with an ambitious long-term vision of Ireland's climate change strategy through to 2050, with objectives and measurable targets around which to galvanise actions and behaviour change, needs to be developed by Government. It should highlight why it is necessary to reduce GHG emissions, the incremental benefits of individual changes and, most of all, the benefits of action and the cost of inaction. The Norwegian declaration of its intention to be carbon neutral by 2050 is an example of such a vision.

Comprehensive communication of Ireland's vision and strategy is crucial to its success, to overcoming inertia, to avoiding procrastination and to creating behaviour change focused on reducing GHG emissions at all levels.

Creating a vision for a climate change strategy should be underpinned by an action plan. As a first step a review of all existing strategies and polices should be undertaken to ensure the trajectories they have set are in line with real long-term aims, targets and needs. This may require updating relevant energy reduction, carbon reduction actions and timelines, as well as introducing new actions and timelines underpinned by relevant data, models and resources.

It is essential that the vision has a long-term perspective beyond the normal political five-year time horizon and that it is shared among all parties and stakeholder groups. The establishment of the Cabinet Committee and cross-departmental committee of senior officials on climate change is an important first step. These new arrangements may need to be supported by a dedicated research resource. Ireland has already demonstrated the courage and ability to change behaviour in areas such as smoking in public places and plastic bag usage.

The necessary support and capacity at all levels of government and local administration should be developed to ensure the effective and speedy implementation of required changes. In particular the planning system at local level will have an important role to play in ensuring that the changes take place quickly and are effective.

Climate proof land-use and spatial strategies, as well as infrastructure investment plans and critical infrastructures.

For Ireland, an important impact of climate change will be changing rainfall patterns and rising sea levels over the period to 2050. This will affect water supply, natural ecosystems and agriculture, and put us at greater risk of flooding and coastal erosion. This could potentially have a number of implications that will need to be considered.

Densely populated areas and critical infrastructures such as power supplies could be at a high risk of flooding in the future. Mapping areas of vulnerability should be a high priority. It is important that current spatial strategies such as the National Spatial Strategy, in conjunction with infrastructure investment plans, take into account the impact of climate change, in particular extreme flooding events and that key future facilities and infrastructures are located in less vulnerable locations. Climate proofing should be an integral part of any national strategy as should new technologies to ensure continuity of power supply, for example flood proof wiring systems and automatic flood barriers round key installations.

Key resources, facilities, power supply, communication nodes and other infrastructures as well as housing developments vulnerable to flooding or other climate change impacts should be identified and relevant strategies for flood proofing developed. As part of this process options and priorities for flood proofing should be identified while assessing and managing ways to mitigate the risks. Working with insurance companies to develop risk trade-offs and cover, and working with industry organisations to encourage contingency plans will be important. Emergency decision making and contingency planning in response to power

failures, extreme flooding events, water shortages etc. should be included in any strategy for adapting to climate change.

For new build and new developments or infrastructures that are vulnerable to climate change, setting clear targets and planning requirements will be crucial so that flood proofing is integrated in the design. The current building standards have an important role to play.

Climate change has the possibility of affecting our water supplies in two ways: scarcity of water supply (because of drier summers and water usage); and extreme flooding impacts, including security of supply and sanitation issues. Water infrastructure schemes should be flexible and adaptable and the full range of options for improving efficient consumption and conservation in water usage should be considered, including the use of pricing mechanisms for all users.

In this light, the taxation system and the present system of local authority financing needs to change. The polluter pays principle for all users needs to be introduced more broadly. This means that the burden falling on certain sectors of enterprise (or on the exchequer) for the purchase of credits should be more widely and more immediately shared in terms of fairness and equity and also to ensure that the necessary messages are conveyed firmly enough to change behaviour.

Maximise the potential for indigenous and FDI opportunities in environmental and energy goods and services.

Combating climate change should also be viewed as a business opportunity for the Irish enterprise base. A number of studies have estimated that the value of the environmental goods and services sector was in excess of $600 billion worldwide in 2005. It is likely to exceed $700 billion by 2010 and $800 billion by 2015[66]. To put this in context, and to underline the growing importance of the sector, this is triple the size of the global aerospace industry[67].

As companies and countries position themselves to take advantage of these opportunities, it is therefore important that Ireland creates the optimal framework conditions conducive to a flourishing environmental and energy goods and services sector in Ireland. Efforts should be made to engage with the investment and financial services sector to raise awareness of climate change and to encourage the emergence of a low-carbon technology sector through direct venture capital investment.

While industrial and commercial sectors emissions accounted for only 17.2 per cent of Ireland's overall GHG emission in 2006, they too have to play their role in the reduction of GHG emissions in tandem with enterprise in other developed economies. There is a relatively high penetration of energy efficiency in the industrial and commercial sectors. This will make it increasingly difficult for the Irish industrial sector to achieve significant further cuts in GHG

66 ENDS Directory 2008, U.K. CEED Global Market Estimate.

67 UK Commission on Environmental Markets and Economic Performance (BERR/DEFRA Report, November 2007).

emissions without damaging cost-competitiveness. The potential concerns of business should be recognised in this regard.

4.7 Transport: Strategic Policy Requirements

In an increasingly globalised economy national and international connectivity, coupled with effective internal connectivity, is critically important for access to markets, efficiency in supply chain management, labour mobility and in mitigating the impact of Ireland's peripheral location.

As a small open economy at the edge of Europe, Ireland should have the international connectivity that allows executives, investors, researchers and tourists to connect as easily with Ireland as with other global locations with which we compete for trade and investment. An efficient and integrated national transport system with adequate capacity and levels of service comparable to other countries with which we compete for investment, plays an essential role in being successful. In addition to supporting Ireland's attractiveness to overseas investors, a well developed transport infrastructure can reduce traffic congestion, increase productivity and reduce costs for existing firms.

Transport, being one of the largest GHG emitters, has a major part to play in achieving Ireland's targets for GHG emissions reductions. The Programme for Government commits to a successor to the *Transport 21* capital investment framework and planning for this is already underway, including a new transport strategy for Dublin and a review of the strategies for Cork and Limerick. It is important that the successor to *Transport 21* takes into account changing demographics, changing spatial patterns, environmental issues and the incorporation of technology such as embedded intelligence.

As noted above the Government's Sustainable Transport Action Plan has proposed a number of actions to address a range of issues in relation to climate change and to forecast how the transport sector will significantly contribute to reductions in carbon emissions by 2020.

Continue to invest in the development of a fully integrated public transport system that provides efficient, cost-effective and sustainable transport for the movement of people and goods.

Transport as an underpinning infrastructure is crucial to ensure that Ireland has a competitive, sustainable economy in 2025. A recent NCC report[68] highlights that infrastructure, including transport, is a key weakness in relation to the drivers of Ireland's future competitiveness. Creating a world-class transport infrastructure will be one of the competitiveness challenges for the future.

68 Review of International Assessments of Ireland's competitiveness, National Competitiveness Council , 2008

There is a need for a fully integrated system that provides efficient, cost-effective transport for the movement of people and goods within the greater Dublin area but also to and between the regions. A greater emphasis on efficient, reliable and fast railways connected with local suburban rail and light rail services is essential to achieve the urban development patterns envisaged in national and regional planning strategies.

A strategic vision for an integrated transport system should be developed that:

- Is forward-looking in its use and application of new technologies;
- Sets a clear framework of targets for transport providers to meet;
- Contributes significantly to reducing carbon emissions and environmental damage associated with travel and transport;
- Reduces the need to travel while enabling access to transport;
- Is a flexible, actively managed and intelligent system;
- Prioritises the use of clean technologies; and
- Builds on and links in with spatial and other infrastructure strategies to ensure maximum integration and effectiveness.

To achieve such a vision, the Government will need to review strategies such as *Transport 21* so that the new objectives can be targeted. The next mid-term review of the current NPD and successor plans will have an important role to play in this regard.

Continue to prioritise major investment in transport infrastructure to 2016 and beyond and communicate effectively the economic and social benefits to the public.

Despite huge public investment in infrastructure in the last few years, Ireland's remarkable economic growth is putting our infrastructure, especially our transport infrastructure, under strain. Yet a first-class infrastructure is vital to Ireland's future competitiveness. Unless we make further improvements, our competitiveness will erode. All demographic projections indicate continued further population growth. We should plan now for first-class transport infrastructure and services that can meet future growth. Continuing investment should remain a priority for exchequer spending in all levels and types of transport so that mass transit systems can provide flexibility of use and integrated journeys. An integrated transport system should not necessarily be a public service investment only. Other service and investment models - for example, the mobile phone industry with licence auctions and private investments, or the air industry with the impact of low cost carriers - should be reviewed for possible financing mechanisms.

Developments in ICTs will provide opportunities for real time, dynamic, differentiated pricing which can be managed automatically and remotely, and reflect the time, speed, level of flexibility and personalisation of any journey, as well as the distance travelled and levels of emissions from modes of transportation used. Pricing mechanisms are needed to 'manage the queue', reduce congestion, distribute usage, promote the use of sustainable transport modes and avoid the risk of deterring commuting by public transport.

Maximise the use of embedded intelligence in transport systems to improve the flow of people, goods and services and to develop world-class logistics solutions.

Any future integrated transport system should use embedded intelligence to maximum effect. This will enable dynamic system management and flexibility so that mass transit strongly resembles personal private transport in terms of flexibility, timeliness and integrated journeys.

These systems should be time-related and transparent so that the arrival time of the next available vehicle to an individual at home or on the move can be delivered by mobile wireless device, TV or computer. The provision of location-related information about buildings, services, transport links, navigation etc. should also be possible. Multi-mode local, regional and international journey planning based on accessible, dynamic, real time information should be a key feature of such systems.

Make carbon reduction and the use of clean energy technologies a central principle throughout the transport planning and delivery systems.

GHG reduction and the use of clean energy technologies will be integral considerations in all future transport system planning and targets being set internationally and transposed nationally which will encourage the development and application of such technologies at all levels. The transport sector is central to reaching Ireland's GHG emissions targets. Modal shift and effective demand and supply management (both hard and soft measures) are needed to reduce GHG emissions in the transport sector, as well as contributing to combating congestion in urban areas.

Encouraging this modal shift requires support and action at all levels. Local transport systems should provide an alternative to private car usage, with the use of ICTs to enable better management of peaks and congestion. Regional connections should provide regular, clean, high-speed links between centres. The economic and social impacts of pricing mechanisms for transportation, including air travel for Ireland should be further considered to ensure users pay the full cost and that requirements for subsidy are clearly identified.

Develop the best possible international linkages from Ireland to key future trading hubs globally.

While ICTs will play a key role in assisting with the continued integration of Ireland in the world economy, there will still be critical economic and social requirements for the transport of goods and people internationally. A long-term perspective is needed of Ireland's key international connection requirements for commerce, tourism and social and cultural requirements, and how these are to be realised in the light of potential international regulatory constraints on fuel for air travel. The importance of direct long-haul air access in addition to competitive short-haul services will need to be considered in the context of other

developments in sea and rail transport internationally. Long-haul rail linkages are already under development to link Europe and Asia. Ireland needs to consider better sea links to the main markets, including those of the future in Asia and South America, and to plan the necessary infrastructure for example, deep sea port facilities or indeed to consider the options for a land-bridge to Great Britain.

4.8 Social Policy and Quality of Life: Strategic Policy Requirements

The long-term strength of the economy depends on an effective social policy that is linked to and integrated with economic and land use policy. The development of a dynamic, knowledge based economy has inherent social implications. In a globalised world, the strength of Ireland's economy and the attractiveness of its society will rest on the same foundation: the human qualities of the people who participate in them.

The nature of Irish society and the values it embodies and respects are the determinants of how people behave, how much they respect themselves, each other and the State. This affects concepts such as social capital, and the degree to which there is trust in people and institutions. Careful analysis, fundamental debate, and institutional reform will all be needed if Irish society in 2025 is to reflect a distinctive consensus among the people who make it up, rather than simply being a by-product of global trends.

The lifecycle approach to social policy as set out in NESC's report on the Developmental Welfare State[69] provides the guiding principles for social policy development in Ireland. This approach was adopted by the National Partnership Agreement, *Towards 2016*, as a means to tackle the problems people face at different stages of their lives and is also reflected in the social inclusion elements of the NDP. The lifecycle approach places the individual at the centre of policy development and delivery and offers a framework for implementing a streamlined, cross-cutting and visible approach to social policy.

Initiate debate on how can Ireland best reconnect to, renew and update its own sense of values and identity.

There is a need for greater debate on Irish values, society and the economy as we emerge from the current crisis that should include redressing of the balance between a strong economic emphasis and the possible adoption of a more northern European model of society. Mechanisms should be developed to create shared perspectives, encourage collaborative and collective responses at local and national levels, examine how to enable ownership of responses to big issues and involve people and enable them to see the impacts etc. Consideration should be given to the development mechanisms for community engagement as occurs in other countries that have compulsory military or community service to revive social cohesion, as well as to address emerging environmental and security issues.

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69 NESC, 2006

There is a need to understand and encourage the longer-term debate as Ireland moves from a relatively closed and poor society to a wealthier and outward looking society, more open to international trends and with more flexibility in both social and cultural terms. This could be done by encouraging the development of wider aspirations and more inner directed self actualisation values, by debating how to replace traditional organising principles and by discussing alternative options for meeting spiritual needs.

Further develop a consistent whole of life approach to social policy.

The lifecycle approach to social policy in Ireland, as advanced by the NESC and adopted in *Towards 2016*, will become ever more important in the years ahead. An integrated and comprehensive approach is required to address the complex social issues that people may face in the future. Given our rapid demographic and societal change, the Government needs to plan ahead and tackle key policy issues on a long-term basis and in doing so could learn from other economies currently experiencing the impacts and implications of an ageing population. In this context, there is a need for a much more comprehensive view of policy options, drawing more from other European countries and beyond.

The necessary support systems, especially targeted at women, to make flexible working a reality should be developed and issues such as childcare, eldercare, disability and support will have to be reconsidered in the light of the changing nature of society and the economy. Longer life expectancies, new trends in retirement patterns, higher healthcare costs, a greater proportion of immigrants bringing different views of family life and responsibilities, increasing self-employment and outsourcing, lifelong learning and other factors will all have to be further incorporated into the goal-setting, planning and implementation phases of social policy. Better data and information systems across government to allow for the early identification of trends and to monitor take-up of services will be essential.

Social inclusion is an important aspect of this whole of life approach. There needs to be better protection for the vulnerable and real equality of opportunity for all, including better opportunities for disabled people and other marginalised groups. Equitable allocation of and access to services, support and resources should be ensured. This can be fostered through wider acceptance of and commitment to the role of the State as a partner and facilitator of social development. While the trend of delivery of services by NGOs, community and voluntary groups may continue, there will be a need to assert the significance of the State as the ultimate custodian and guarantor of basic rights. Without recognition of the benefits of solidarity, support and shared responsibility, the commitment to the State and its institutions by marginalised groups, probably also including some non-national groups, may weaken.

Integrate economic, social and land use policies around the needs of individuals.

Understanding how to balance and achieve sustainable economic growth as well as meeting social needs should be part of enterprise, social and land use policy agendas. Economic and social policies should be seen as mutually reinforcing rather than mutually exclusive of each other and land use policy should be effectively integrated in national policy to ensure delivery

of improvements in quality of life. Success in economic policy will provide a solid foundation for benefits in social policy and success in social policy will feed into a better economic policy regime.

Ireland is currently going through a fundamental societal change and there is a need to ask what sort of society we want in the future. People should be at the heart of both economic and social policy. The economic success achieved over recent years has been underpinned by a specific social dividend, ranging from childcare to sporting, cultural and social resources, to care of the elderly. All these in the past were provided by the voluntary sector, organised religion, and families and community groups. These resources will not be available to anything like the same extent in the future. In fact, the economic growth of recent years has had significant side effects, most notably congestion and long-distance commuting, which cut down on leisure time and thus militates against the voluntary provision of services to the community. This will be only partly alleviated by new types of services enabled by next generation networks. It is clear that the State's role, direct or indirect, in the provision of services will come under severe demand pressures. This needs to be factored into the economic model adopted.

Greater ambitions are needed for the long term beyond just the reduction of poverty, important though that is. A range of additional priorities will be needed to provide high quality living and working conditions and a sustainable increase in well-being. They include skill development and lifelong learning, the arts, sport and recreation, and the management of public spaces. Incentives and supports in all these areas should be examined. Taxation policy will play a significant role in this, and the degree to which it should be recast to encourage longer-term social and economic objectives will be an important question to be addressed. In so doing, real options for increasing quality of life and maximising return on investment should be examined. Ireland's current National Development Plan sets out a milestone of building a prosperous Ireland for all its people, characterised by sustainable economic growth, greater social cohesion and balanced regional development. The issues raised above should be taken into account in the development of the next National Development Plan post 2013 to build on the success made to date.

Specifically in relation to healthcare and provision of long-term care, there is an increasing demand to ensure the efficiency and effectiveness of expenditure, the ability to improve outcomes at the individual condition level, continuous improvement of quality and delivery of healthcare services and the more rapid adoption of therapeutics and clinical practice. Key to this is ensuring that the healthcare system embeds a culture of research and continuous improvement and ensures that the system attracts people of the highest calibre. Specialisation in areas of relevance to Ireland should be built upon to include the evaluation and monitoring of health outcomes. In response to the ageing population social delivery and community care services will be all important as will the further incorporation of preventative medicine as a policy response. ICTs will play an important role in the delivery of remote diagnostics, lifetime care and advanced therapeutics.

Develop a clear, national, agreed long-term strategy on immigration.

A remarkable social change has been going on in Ireland since the mid-1990s, as the country has changed from an emigrating society to a society with one of the highest rates of immigration in the world. The CSO's estimates for the fourth quarter in 2008 showed a total of 476,100 non-Irish nationals aged 15 and over in the State, an increase of 8,000 from the 2007 fourth quarter. With non-nationals having made up 16 per cent of the workforce it is clear that Ireland has moved from being one of the most homogeneous countries in the EU to a country with a rate of change that is unparalleled in speed and scale. In adapting to this relatively new phenomenon in the history of the Irish State there are many challenges for the economy and society, but it also presents many opportunities. Most recent figures from the CSO show a decrease in immigration from 109,500 in April 2007 to 83,800 by April 2008. This is clearly as a result of the current economic crisis both nationally and globally.

The continued expansion of the EU will provide a further dimension to the immigration issue. The inclusion of Turkey, the Balkans, Ukraine, Georgia and Armenia is conceivable over the period to 2025. The principle of free movement of labour within the EU is likely to be intensified and extended to neighbouring countries to some degree. Furthermore, closer economic ties with India and China will inevitably mean increased labour movements in both directions, building on the complementarities in skills rather than on labour costs. A greater number of migrants within Europe does not of itself mean that more will come to Ireland, but it means that policy choices on education and training have to be made in light of the new realities. For instance, a more selective training policy within Ireland in certain skills would recognise that many generic and some specialist skills could be imported, allowing us to specialise in a smaller number of advanced areas.

A clear, national, agreed long-term strategy on immigration should be developed. In developing it the resulting immigration policies should be fair, sustainable and respect the needs of countries of origin as well as Ireland. The policies developed should not be seen in isolation from broader social and economic policy goals but should be developed, and managed, in a coordinated fashion between all government departments to ensure greater coherence. Optimum population size should be considered as an underlying factor, and Ireland's policy should be recognised as best practice in this field.

To demonstrate the role and contribution of immigration in Irish social and economic development and defuse current prejudices, quantification of the costs and benefits of immigration should be established, including the impact of migrants returning to their country of origin. Data collection on immigration should also be improved to assist in the development of long-term evidence based policy.

Develop a coherent framework of support for immigrants.

In addition to the issues for the education and training systems for migrants as set out above, a coherent framework of support for those immigrants whom Ireland might want and need in the future should be established. An important element of this framework should be the successful integration of migrants into society. Integration requires a long-term approach by

Government, which should take the lead, but debate on integration should also incorporate a bottom-up approach. In *Towards 2016* the Government is committed to developing a comprehensive strategy on integration following consultation with relevant stakeholders. As NESC's Report on Migration states, integration requires buy-in from all stakeholders, including many perhaps who do not yet realise that they are stakeholders.

Spatial planning issues and internal migration of populations within Ireland to achieve better balance and integration should be examined. Appropriate local and regional resource strategies for social and support infrastructures, schools etc. should be a central component. Language proficiency should be required and the relevant support and training should be provided.

To attract migrants with the required skills set, the 'reverse Diaspora' can play an important role in marketing Ireland as a good place to work and live. It is therefore important to ensure that the migrant's view and experience of Ireland is positive and that a network of Irish links into other countries is developed.

4.9 Planning and the Regions: Strategic Policy Requirements

The Irish population has grown by a third over the last decade and economic development, with consequent increases in incomes, has been among the highest in developed economies. Continued population and economic growth into the future, albeit at more moderate levels, raises issues for the environment, the location of economic activity, dwellings, leisure and amenity facilities, and the infrastructural implications of particular patterns of development. Since land is a finite resource, its allocation and efficient use will be a key public policy issue for the future.

From an enterprise development perspective, it is important that the planning system uses the available land to best effect and ensures that the appropriate supporting infrastructure is in place.

The Government launched the National Spatial Strategy (NSS), the main policy framework for planning and development in the regions, in 2002. Recognising the major role cities play as key drivers in the development of competitive regions in modern economies, the NSS identified nine large urban centres as 'gateways' for focused development and linked hub towns for co-joined development. The NSS has achieved much as outlined in Section 2. But since its introduction, many of the underlying assumptions have changed, including population growth and spatial patterns. The increasingly important role of cities as conduits and enablers of economic development and the building of related competencies for competitive advantage in new and emerging enterprise activities is particularly relevant.

Develop and implement a new all-island spatial strategy.

There is a need to revisit the current NSS given the pace of population growth and the changing spatial patterns of economic and social activity over the six years since its publication. It is now opportune to take a fresh look at Ireland in its entirety on an all-island basis, given the pace of economic development in the North over recent years. A new NSS should emphasise the role of regions and centres as parts of an integrated system on this

small island. This will encourage better coordinated planning and development and achieve a step change away from approaching planning isolated and separate from economic activity. The new strategy should seek to develop regional centres of real scale and competitiveness that provide a new focus for investment and reduce the need to travel. To achieve such a strategy, there will need to be:

- More clearly defined, tighter planning controls and guidelines;
- Strong planning decision making frameworks at every level, local, regional and national;
- Strong and effective, devolved local and regional leadership, decision making and governance;
- Significant levels of investment;
- The development of more physically concentrated regional centres and communities;
- Development of alternative technologies such as ICTs, wireless broadband etc.; and
- Integration of land use and transport.

Effective regional and spatial planning should link in with other policy areas and objectives, especially ICT infrastructure and transport. There will need to be sufficient good quality transport networks between regions and within regions to create proximity and economic critical mass.

There is a need for clear timelines and action plans for targets, decisions and implementation in all areas, but especially to achieve the following three critical areas of development that underpin successful economic development:

- High levels of intelligent infrastructure;
- Universal high-speed communications and access to ICTs; and
- Flexible transport systems based on clean energy.

Review and strengthen the planning framework and systems to achieve a coherent and rigorous strategic planning regime.

A much stronger national, regional and local planning framework is going to be needed, that recognises the importance of providing a clear strategic direction for development from national to regional and local levels.

For key public investments, the planning and approval processes should be fast-tracked so that implementation can begin as soon as the substantive decision is taken and funds secured. The Planning and Development (Strategic Infrastructure) Act, 2006 greatly assists in this regard. This Act allows for applications for planning permissions for strategic infrastructure developments to be made directly to An Bord Pleanala and makes provision for speedy decisions. It is important that the judicial system has appropriately resources to ensure speedy planning processes for key infrastructure projects.

There is a need to better manage the growth of the Greater Dublin Area and the pressures that its outer suburban hinterland is creating on the physical and social infrastructure.

To ensure that a more strategic approach is achieved there will be a need to coordinate the work of all state bodies and local authorities responsible for the built environment. Regional spatial planning and transport management will be important in managing Dublin's urban sprawl and also that of other urban centres. The Dublin Transport Authority (DTA) Act 2008 facilitates the establishment of a new transport authority with overall responsibility for coordinating transport in the Greater Dublin Area. The DTA will have responsibility for the allocation of exchequer funds, and the power to ensure the delivery of priority transport projects. It will also have the power to contract for services, which will allow for the integration of services and infrastructure.

Create a clear and robust regional framework to ensure all regions achieve their potential and that we build vibrant, sustainable and competitive cities.

Each region of the country has endowments and strengths that need to be built on and further strengthened.

This is all the more important as Dublin makes progress in achieving a self-sustaining dynamic of growth and international competitiveness. What differentiates Dublin from other regions in its role as an international centre will need to be established and emphasised. Other cities and regions in the country need to similarly plan for and develop an appropriate and self-sustaining growth dynamic, which will require excellence in planning and a greater prioritisation in investment. Forward-looking development of the regions will be essential.

Major cities play an increasingly crucial role in the development of competitive regions in modern knowledge-based economies. A UK study[70] found that the types of economic sectors that lead the growth of advanced economies are heavily concentrated in or near major cities and that the attractiveness of these cities has a major impact on the competitiveness of regional economies as a whole. Development of Ireland-wide targeted access to key infrastructures will be necessary to ensure economic growth centres in the regions. The recent work of the National Competitiveness Council (NCC) on the role of cities in competitiveness is instructive in this regard. To create proximity and economic critical mass, appropriate and good quality regional transport networks between and within regions will be needed. Effective regional and spatial planning should link in with other areas and objectives, especially ICT infrastructures.

In developing a strategy to build and strengthen the contribution of each region to national competitiveness there is a need to focus on the competencies of each region and on exploiting agglomerations, the phenomenon of economic activity congregating in or close to a single location. Agglomeration plays a major part in the productivity of a region. For example, firms located close to others in the same industry tend to find out more rapidly about new technologies and markets. They are therefore more productive than firms located far away from the centre of industry.

70 "Our Cities are Back", Office of the Deputy Prime Minister of the UK, November 2004

4.10 Governance: Strategic Policy Requirements

Good governance is important to the economic development of a country. The State plays a critical role in promoting economic growth through management of the economy and financial systems and its encouragement of the conditions that enable sustained entrepreneurialism. Effective governance and regulatory and quality control systems and processes alongside the development of a strong and dynamic private sector are essential if Ireland is to take full advantage of the benefits of globalisation.

Ireland has a relatively complex administration structure, but by international standards it is quite accessible. The reform of Irish governance structures has been debated for many years. Most recently, the publication of an OECD review of the public sector concluded that to maximise the public service's contribution to achieving societal objectives and meeting citizen's expectations, increasing thought about public services as an integrated system is needed[71]. There are implications here for governance within Government and across the public service.

One of the most important messages emerging from the scenarios and the wider consultation process is the need for strengthened national (as distinct from regional) governance, and for leadership and vision at all levels in Ireland. Effective governance will be crucial to delivering on the vision of Ireland as being one of the most competitive, sustainable economies in the world in 2025. The aforementioned OECD review acknowledges that: "*Success in achieving the vision of a more integrated public service will require strong leadership at political and administrative levels to move from a traditional control position, to one of vision, support and direction in developing the modernisation and change agenda*".

Review current governance structures and the nature of executive power at each level of public administration in Ireland to ensure we have the capacity to plan strategically and invest in a cohesive and efficient manner for the future.

Public debate and agreement needs to be initiated over the kind of local, regional and national governance and decision making we want in Ireland. The perceived high levels of inertia in the system as it stands need to be overcome if significant changes in governance and local and regional decision making are to be successful. Trust and transparency need to be enhanced and embedded within the system by building on or extending existing mechanisms such as freedom of information or Revenue Online or by developing and introducing new mechanisms. To create an effective governance system that has a holistic approach to both policy development and implementation, a new model of decentralisation that recognises that decentralisation does not mean devolution needs serious consideration.

The public sector needs to more broadly exploit the huge potential of technologies as a means of achieving better government, for example, through making intelligent use of ICTs or introducing fully interactive egovernment. Egovernment has the capability to ensure greater engagement with citizens, create higher productivity in terms of reduced costs, and deliver more efficient administrative procedures, higher quality services and better policy outcomes.

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71 OECD Public Management Reviews, Ireland: Towards an Integrated Public Service. www.oecd.org

It could also introduce greater transparency and accountability in public decision making and allow citizens to avoid the need to understand the complex structures of government to be able to deal effectively with it.

Ireland will need also to continue to review how it can best influence decision making within a changing EU and in the context of the changing influence of multilateral bodies. The need for bilateral arrangements where multilateral arrangements break down or are not working in Ireland's interests also needs consideration. Achieving coherence at national level is a prerequisite for influencing on the international stage.

Both in Ireland and internationally, there is increasing recognition that it is just as important to concentrate on the quality of life and progress of a society as is it to focus on economic growth. Within the current competitiveness framework people's contribution to the economy is measured in terms of GDP. The social dividend or bonus is not fully incorporated.

Develop a new value system for public governance and decision making, building on the 'lifecycle' approach to public policy set out in *Towards 2016*.

In Ireland the 'lifecycle' approach was advanced by the National Economic and Social Council (NESC) and adopted in the Social Partnership agreement *Towards 2016*. It now needs to pervade all aspects of public policy formulation and delivery. Social partnership has proved a successful working model, providing a framework and an effective process for developing a shared understanding of the forces and the trade-offs driving economic and social progress. Social partnership has been the cornerstone of the economic success that Ireland has experienced over the past decade. For the future, the need for agility in the partnership approach will be even greater in the face of changing internal and external circumstances and needs.

A new framework for sustainable competitiveness needs to be developed that includes new metrics for valuing different roles in society and contributions to the economy as a whole. There are new challenges to the social foundations of development. The social bonus that contributed to Ireland's success will gradually run out. Social and non-market conditions will be necessary for future success. Social investments in education, health, housing, transport, childcare etc. are not merely costs, but crucial inputs and building blocks of the economy. For example, current measures favour women who go into the workforce more than mothers who stay home. Informal welfare provision is overlooked. While there are some mechanisms in place such as tax instruments to reward people who nurture families as well as work, many other mechanisms need to be introduced to ensure that the social dividend is fully realised. The Government's announcement of the establishment of a system of pre-primary education in the Supplementary Budget is welcome in this regard.

The challenge for the State is to steer economic and social endeavour towards objectives of improved living standards, well-being, quality of life, social cohesion and inclusion, and environmental sustainability.

Develop a long-term framework for investment prioritisation and the sustainability of public finances.

As noted in Section 2, Ireland and rest of Europe will face a demographic challenge over the coming decades that will give rise to long-term issues over the public finances sustainability. Ireland's old age dependency ratio will rise from 16 per cent in 2004 to around 45 per cent in 2050, a higher rise than the projected EU average. The projection for age-related spending is also well above the EU average, with a rise of 7.8 percentage points of GDP between 2004 and 2050 forecast. Much of the projected increase is due to pensions expenditures, but increases in healthcare and long-term care will also be significant. This makes prioritisation of investment in productivity enhancing areas over the short- to medium-term all the more important. Adequate prioritisation will reduce the sustainability risks to the public finances over the longer-term and ensure that the resources required in the context of an ageing population are available.

5. Conclusions

The forces of change, the global trends and the potential scenarios that determine Ireland's future are already underway.

In response, this report has brought forward a set of strategic policy requirements intended to be robust enough to ensure that Ireland makes the most of the opportunities that will arise, while countering the major threats.

While the strategic policy requirements are not recommendations as such, we believe they are well-founded because they relate to critically important areas for the future and consideration of the issues and responses need to begin as soon as possible.

When considering these policy areas and requirements, there is a need to take into account the resources available, including exchequer funds, and to prioritise accordingly. Notwithstanding current difficulties, Ireland will need buoyant revenues to support all these policy requirements and prioritisation of expenditure will be necessary.

The trends reviewed, consultations completed and the scenarios developed in the preparation of this report highlight the range of areas in which policy decisions will have a substantive impact on future enterprise development, jobs, incomes, growth and ultimately on future national prosperity.

Overall, three areas for priority focus are proposed to give effect to the recommendations set out above:

- The first is to place sufficient emphasis on long-term thinking into today's policy analysis, decision making and implementation in relation to economic and social development, public finances and energy and environmental policy;
- The second is to develop our institutional capacity to anticipate and prepare for future challenges, trends and opportunities in a systematic way. Established methods for forward-looking integrated assessments such as horizon scanning, should be structurally incorporated into all government departments. A centre of excellence or public sector observatory of national and international trends and developments would be of benefit, with the role of supporting departmental activities and policy deliberations;
- The third is the increased need for relevant areas of the public sector to work more cohesively and collaboratively in policy formulation and implementation on the major cross-cutting priorities in areas such as competitiveness and enterprise development, labour market developments, climate change and energy policy, social inclusion and cohesion and well-being.

With the right policies, Ireland can successfully continue to transform the enterprise base to one with a self-sustaining dynamic of innovation and growth in high-productivity sectors, which is providing well-paid and fulfilling employment and which can compete and win in world markets. The longer-term competitiveness, including cost competitiveness, of the business environment in Ireland across the areas outlined in this report will provide the essential platform for underpinning this transformation.

Ireland has demonstrated vision and leadership in the past. We have shown a capacity to take a longer-term perspective, to prioritise and to invest for the future in key areas such as education and research, transport and infrastructure and in making pension provisions for an ageing population. As the pace of change accelerates and policy formulation and delivery increases in complexity such vision and leadership is even more important. We must demonstrate it again.

Appendix 1: Focus Group Memberships

International Organisations

ORGANISATION	
UNOSAT United Nations Institute for Training and Research (UNITAR) -Operational Satellite Applications Programme	**Francesco Pisano** Head, Institutional Relations
UNIDIR United Nations Institute for Disarmament Research	**Patricia Lewis** Director
UNCTAD United Nations Conference on Trade and Development	**Heiner Flassbeck** Director, Division on Globalisation and Development Strategies
WTO World Trade Organisation	**Michael Daly** Head, Asia and Oceania, Trade Policies Review Division
UNECE United Nations Economic Commission for Europe	**Robert Shelburne** Senior Economist
WHO World Health Organisation	**Eugenio Villar** Coordinator
ILO International Labour Organisation	**Gerry Rodgers** Director, Institute for Labour Studies

International Investment Community

ORGANISATION	
Gartmore	Gervais Williams Head of UK and Irish Small Companies Funds
HSBC	Farley Thomas Global Head of Business Development
JMP Chase	Ron Friend - SIDM JP Morgan Securities Ilias Benhima - JMP Chase – RPS Legal
MAN Group	Frank Raschke Head of European Equities Sales
Nomura	Russell Pullan Director, New energy &clean technology ventures
Orbis Capital	Jeremy Barnes Director & Founder
Policy Plus, London	Graham Cottingham CEO
Signet Management	Ric Berman CEO
UBS MD Equities	William Kennedy Managing Director

Food and Drinks Industry Ireland

ORGANISATION	
Dawn Farm Foods	Larry Murrin CEO
Britvic Ireland	Donald Williamson Sales & Marketing Director
Cadburys Ireland	Donal Byrne Chairman
GlaxoSmithKline	Elizabeth Reynolds General Manager, Consumer Healthcare
FDII (Food and Drink Industry Ireland)	Kieran Fitzgerald Economic consultant to FDII
FDII (Food and Drink Industry Ireland)	Paul Kelly Director

Irish Venture Capital Association

ORGANISATION	
Bank of Scotland Venture Capital	Joe Concannon Investment Director
Dublin Business Innovation Centre	Des Fahy Chief Executive
4th Level Venture University Seed Fund Ltd Partnership	Dennis Jennings Founder
Act Venture Capital Ltd	Niall Carroll Managing Director
Irish Venture Capital Association	Regina Breheny Director General

PharmaChem Ireland and the Irish Bioindustry Association

ORGANISATION	
Growcorp Group Ltd	Michael Donnelly Chairman
Allergan Pharmaceuticals Ireland	Paul Coffey Operations Manager
Organon Ireland Ltd	Peter Quinn Managing Director
BioIndustry Association	Mike Comer Chair
PharmaChem Ireland	Matt Moran Director
PharmaChem Ireland	Nessa Moyles Senior Executive

Irish Medical Devices Association

ORGANISATION	
Stryker Orthopaedics	Pat Foristal Vice President
Creganna Medical Devices	Helen Ryan CEO
Abbott Ireland	John Kilcoyne Director of Operations
Bausch & Lomb	Colum Honan
Irish Medical Devices Association (IMDA)	Sharon Higgins Director
BioMed Ireland	Mark Cooney Project Manager

ICT Ireland

ORGANISATION	
Xerox	Conleth O'Reilly Chair of ICT Ireland
Google	Iarla Flynn European Policy Manager
HP	Anthony Canavan Business Development Manager
Symantec	John Connolly Finance Director
IBM	Barry O'Brien Manager of Operations & Marketing
IBEC	David Coughlan Head of Economics & Taxation
ICT Ireland	Aoife O'Brien Executive
ICT Ireland	Kathryn Raleigh Director

Disadvantaged Groups

ORGANISATION	
National Adult Literacy Agency (NALA)	Inez Bailey CEO
Society of St. Vincent de Paul (SVP)	John-Mark McCafferty Head, Social Justice
One Family	Candy Murphy Policy & Campaigns Manager
Combat Poverty	Sean Mistéal Head of Organisational Development and Management

Consumer Focus Groups

LOCATION	
Dublin	C1C2D, 30-40 years
Athlone	C1C2D, 50-60 years

Immigrant Focus Group

COUNTRY	
China – Hong Kong	Dr Lawrence Lee
Nigeria	Clement Esebamen
Uganda	Charles Mutawe
Latvia	Baiba Kalnina
Scotland	Douglas Cubie
South Africa	Dr Zureena Desai
Philippines	Michael Ancheta
Gambia	Mbemba Jabi
Lithuania	Rita Lutnikovaite
Poland	Katarzyna Mejger
Ghana	Dr Wilberforce Owusu-Ansah
Poland	Anonymous
Poland	Daniel Sobzak
India	Prashant Shukla
Poland	Blazej Nowak
Latvia	Karlis Briedis

Appendix 2: Expert Interviewees

ORGANISATION	
SFI Science Foundation Ireland	**Dr. Frank Gannon** Director General
ICI Immigration Council of Ireland	**Fidele Mutwarasibo** Research and Integration Officer
SIPTU Services, Industrial, Professional and Technical Union	**Manus O' Riordan** Head of Research
DCENR Department of Communications, Energy and Natural Resources	**Brendan Tuohy** Former Secretary General
Labour Party	**Ruari Quinn** TD
Fine Gael	**Dr. Garrett Fitzgerald** Former Taoiseach
University of Limerick	**Dr. Ed Walshe** Founding President of University of Limerick (UL) Founding Chairman of the Irish Council for Science, Technology and Innovation
Forfás	**Helena Acheson** Divisional Manager, Enterprise Policy
IBM Global Treasury	**Dr. Tom Hardiman** Chairman
ISME Irish Small and Medium Enterprise	**Mark Fielding** Director General
Migration Policy Institute Washington DC	**Dr. Demetrios Papademetriou** President

Appendix 3: The Four Global Scenarios for Ireland to 2025

The framework used for the development of scenarios is based around those trends that have the greatest uncertainty and highest impact on the key strategic question. There are many methods employed to build scenarios. **The underlying criterion for any method is that it produces a number of scenarios that are inherently different, internally consistent and plausible**.

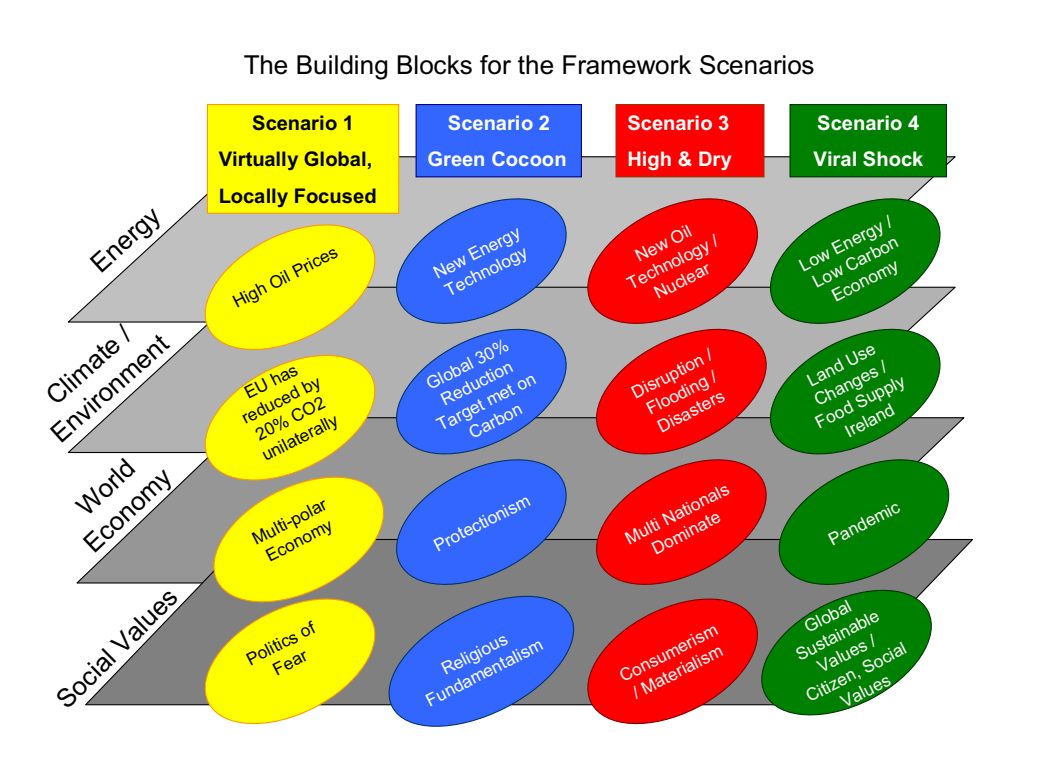
In developing the building blocks for the scenarios the clusters were further refined, as indicated in the table below, into:

- **Key areas of critical uncertainty** that became the key components of the framework scenarios. These represented the areas of change that have the highest degree of uncertainty and the highest impact on the key strategic question and that are largely outside our control;
- **Underlying drivers of change** that would inform and enrich the scenario outlines; and
- **Policy variables** which, together with other 'factors and actors' would be set within the context of the scenario outlines to assess how they would develop under different circumstances.

Critical Uncertainties	Drivers of Change	Key Policy Variables (Factors)
▪ Changing nature of energy supply and security ▪ Consistency and complexity of regulation and response to climate change ▪ Who / what is driving and shaping the world economy? ▪ Changing social values and quality of life	▪ Scale, scope and impact of technological change ▪ Access, availability and potential use of natural resources and materials ▪ Increasing fragmentation, friction and potential conflict ▪ Changing demographics	▪ Growing importance of education and skills ▪ Changing infrastructure needs ▪ International governance and regulation

In this project, four critical uncertainties were identified through the analysis of the drivers of change as equally important in providing the framework for the scenarios. Prioritised outcomes or 'polarities' (which were the most important in defining inherently different or alternative futures) under each critical uncertainty were combined together into four sets – one from each critical uncertainty – which logically fitted together and which formed a viable framework for the development of the scenarios. The schematic diagram below illustrates the

combination of the outcomes which formed the framework for the development of the four socio-economic scenarios.



The Scenarios in Brief

The scenarios are written to show Ireland within an international context, followed by a more local Irish focus. The scenarios are accessible, stand-alone outlines and usable tools to assist policymakers and others in thinking about the future. The tables below summarises the main characteristics of the four scenarios.

Scenario 1

Global - Key Characteristics

- Continued global economic growth, new major economies with thriving consumer markets
- Competition for inward investment very high
- High energy prices and effective agreements result in 20 per cent GHG emissions at EU level
- Real-time energy and carbon emissions monitoring
- Many opportunities in process innovation
- World is less physically mobile, electronic communications and advances in biotech provide a more virtual world
- Fear and suspicion as major driving forces leading to tighter global controls

Ireland - Key Characteristics

- Strong economic growth – Ireland as an investment hub, China as significant investor
- Industry structure – similar to now
- Nuclear energy has grown – Ireland connected to a European grid
- Irish population at 8 million on an all-island basis
- Innovation is driving enterprises with Ireland as a leading exporter of high-value food
- Unemployment is low, self-employment and entrepreneurship levels are high
- Increased investment in infrastructure – carbon constraints increasing public transport use – public and private investment
- Healthcare - private, specific risk based provision. Genetics are fundamental to diagnosis and treatment. Food an important part of healthcare.

Scenario Outline

This scenario presents a world in which global economic growth has continued at a fairly steady pace, with the major new BRIC economies and their thriving consumer markets the major divers of growth, together with the success in technology leapfrogging.

High energy costs and effective bi-lateral arrangements result in the EU achieving the 20 per cent targeted reduction in greenhouse gas emissions. While there is less travel worldwide, electronic communications together with advances in biotech provide a more virtual world.

Ireland continues to grow strongly, establishing itself as an investment hub from both these new economies accessing European markets and from 'energy economies' managing their wealth out of Ireland. Nuclear energy has grown across Europe and while Ireland has no plants of its own, it is connected to the European grid. Regulation has driven investment in alternative energy by providers and consumers.

The all-island population has reached 8 million, with a growing share of non-nationals. Ireland has remained open to immigration, under specific conditions.

There has been a move to more legalistic approaches to defining rights, roles and responsibilities and tolerance of alternative lifestyles has diminished. Irish business structures are similar to those of the early 2000s, successful in attracting FDI, with China and India now leading origins of investment. R&D expenditure is nearing 3 per cent of GNP. Innovation and a drive for quality have established Ireland as a leading exporter of high-value food produce.

Accelerated infrastructure investment provides the required capacities for economic and social development and greater carbon monitoring has increased public transport use. Third level participation has reached over 75 per cent. Unemployment remains low and self-employment and entrepreneurship levels are high. Health care is private and expensive.

Scenario 2

Global - Key Characteristics

- Dampened global economic growth – protectionism is high, regional trading blocks, 'fortress Europe', economic nationalism
- US no longer world leader – emergence of BRICs
- Small businesses and self-employment flourish – more lifestyle based
- High levels of innovation – due to high energy costs, new clean technology success but some duplication of research effort
- Global tensions over water supplies particularly of shared water supplies are
- Global reduction in CO_2 emissions – but slow in responding, flood defences necessary
- World politics is more issues-based-politics fragmented – with strong environmental influence

Ireland - Key Characteristics

- High energy costs and stringent regulations – spurring innovation in environmental technologies
- Ireland as a sophisticated user and licensor of technologies
- Ireland more energy secure
- Global immigration is high but Ireland has a controlled skills base migration policy
- Economic nationalism is reducing FDI investment but entrepreneurship is flourishing
- Public transport is excellent and widely used
- Education is fragmented but flexible
- Food is expensive with polarised food markets
- Localism, community based activities are thriving – more self reliant and inward looking
- Healthcare is national and of high quality but through regional hubs
- Genetic information is actively used but is being resisted

Scenario Outline

In this scenario the world economy is in shock following environmental disasters of early 2010s and for the most parts remains unstable with some parts yet to recover. The US is no longer the world economic leader, with the new BRIC economies driving growth, though based on more populist policies. This has led to a more protectionist world trading system and economic nationalism is widespread.

It is also a world in which tensions are mounting worldwide over natural resources, particularly water. World politics is much more issues-based, with a strong influence from environmental movements, in some cases fundamentalist in approach, which are being met with tough government actions.

High energy costs and more stringent environmental regulations have spurred innovation in environmental technologies, from which Irish enterprise benefits greatly both as a user and licensor of technologies and Ireland itself is more energy secure.

Global migration is high and Ireland has a very controlled skills-based immigration policy and is somewhat of a 'fortress Ireland'. Economic nationalism has reduced FDI into Ireland and entrepreneurship has flourished. Food is expensive and agriculture in Ireland is more high-tech and intensive. In part, on the back of Ireland's success in energy and environmental technologies and business application of new technologies, R&D investment has reached 3.5 per cent of GNP.

Public transport is excellent and widely used and local energy solutions are more prevalent.

In this scenario communities are more inward looking and Irish society is less tolerant and more fundamentalist in some areas. Healthcare is excellent and delivered remotely for the most part and also delivered from regional-hub centres of excellence.

Scenario 3

Global - Key Characteristics

- Market driven, efficient, image conscious, mobile world, 24/7 global and local worlds
- Big business rules, international governance weak
- World economy is patchy and societies are stratified
- Many climate change disasters – lasting impact on global economy, with slower economic growth
- Commodity prices remain high and water is particularly scare
- Widespread use of nuclear – plentiful electricity supplies
- Brand is King – services are very personalised with location-based systems and services the norm

Ireland - Key Characteristics

- FDI is still important from US and BRICs
- R&D predominately business funded
- Entrepreneurialism and SME activity are very strong, high tech business services, personalised services have boomed
- Communications networks are at the heart of the economy
- Highly integrated transport system with increased privatised provision of services
- Communities more physically concentrated in regional centres, community facilities are available 24/7
- Boundaries between food, nutrition and healthcare are blurring
- Food security is a major issue

Scenario Outline

This scenario presents a world in which climate change induced natural disasters during the 2010s have had a lasting impact on the global economy, with growth now slower than the 1990s/2000s. While emerging economies have caught up technologically, their domestic markets have not expanded significantly. Commodity prices remain high and water in particular is scare and a source of tension internationally.

Multinational business has strengthened its role in global governance and in influencing policy decisions. Widespread use of nuclear energy results in plentiful electricity supplies, although oil prices remain high and limited for 'essential' usage. The EU continues to play a strong international role in policy coordination and dispute resolution.

The Irish population is more spatially concentrated. Increasingly private infrastructure provision has led to more efficient service provision. FDI continues to be important for the Irish economy, and although competition is high, Ireland benefits from both US and emerging economy inward investments.

In this world, R&D is predominantly business funded and entrepreneurialism is high. Food production is much more centrally planned and controlled. Transport systems are highly integrated. High-end economic migration has continued in to Ireland, mainly from developed economies and Africa.

Scenario 4

Global - Key Characteristics

- Successful shift to low carbon economy, world economy performing well, good international governance
- Major shift in behaviour re. climate change, development of 'easy-green' and 'easy-clean' solutions
- Arrival of a pandemic – trade and travel ground to a halt, market and supply chains are severely disrupted
- Global cooperation is holding up with clear vision and leadership being essential
- Populations are sharply reduced
- Healthcare services and pharma-companies overwhelmed – often it is the small companies that find the solutions because of flexibility

Ireland - Key Characteristics

- Ireland remains closed to international travel – black economy grows
- Those with wealth and savings are surviving better
- Diversity of supply helps keep power going
- Virtual economy is still functioning – importance of being connected with ICTs underpinning economy
- Escapism as big business – online economy flourishing
- Innovation and development – helped by global cooperation, open source work and regulation lite
- Food security is a key political issue
- Local controls, leadership, entrepreneurship, food production

Scenario Outline

In this scenario world, the global pandemic in the mid 2010s is a major shock to a world economy that had been growing strongly and had made significant progress towards a low carbon economy through strong unilateral global governance.

In this world, trade and travel ground to a halt and all markets and supply chains are disrupted. In some parts of the developed world, death tolls reach 20 per cent and in the developing world up to 40 per cent. Breakthrough innovations in genetic based vaccines and treatments are one of the few positives from the pandemic, together with the sustained strength of global governance in responding to crises.

Electronic communications for commerce and social purposes remains the norm and has sustained economic growth. Food security is a key political issue.

The viral shock has essentially resulted in Ireland, as with most developed economies, remaining essentially closed to international travel. The black market is thriving and skills registers are being developed of those with essential skills. Those with wealth and savings are surviving much better through this global pandemic.

Appendix 4: Glossary

ASEAN	The Association of South Eastern Asian Nations
BRIC	Brazil, Russia, India, and China
CORI	Conference of Religious of Ireland
CSO	Central Statistics Office
DCENR	Department of Communications, Energy and Natural Resources
DES	Department of Education and Science
DETE	Department of Enterprise, Trade and Employment
DTA	Dublin Transport Authority
ESRI	Economic and Social Research Institute
EGFSN	Expert Group on Future Skills Needs
ESB	Electricity Supply Board
ESG	Enterprise Strategy Group
FDI	Foreign Direct Investment
FDII,	Food and Drink Industry Ireland
GDA	Greater Dublin Area
GDP	Gross Domestic Product
GHG	Greenhouse gasses
GNP	Gross National Product
HEA	The Higher Education Authority
ICTs	Information and Communications technologies
IDA	Industrial Development Agency
IEA	International Energy Agency
IMDA	Irish Medical Devices Association
ILO	International Labour Organisation
IPA	Institute of Public Administration
IPCC	Intergovernmental Panel on Climate Change
LNG	Liquid natural gas
NGO	Non-governmental organisations
UN	The United Nations
NALA	National Adult Literacy Agency (NALA)
NCC	National Competitiveness Council

NDP	National Development Plan
NESC	National Economic and Social Council
NGNs	Next generation networks
NPRF	National Pensions Reserve Fund
NSS	National Spatial Strategy
NTMA	National Treasury Management Agency
NUI	Natural user interface
MNCs	Multinational corporations MNCs
OECD	Organisation for Economic Cooperation and Development
R&D	Research and Development
SEI	Sustainable Energy Ireland
SFI	Science Foundation Ireland
SSTI	Strategy for Science, Technology and Innovation
SVP	Society of St. Vincent de Paul
Toe	Tonnes of oil equivalent
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
UNITAR	United Nations Institute for Training and Research
UNOSAT	United Nations Operational Satellite Applications Programme
WEF	World Economic Forum
WHO	World Health Organisation
WTO	World Trade Organisation