Infrastructure for an island population of 8 million

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InterTradeIreland

Engineers Ireland

The Irish Academy of Engineering

Context for the Report

- **Look ahead 25 years to the 2030s**
- **An increase in population on the island of Ireland to 8 million**
- **A more competitive world with China, India and Brazil the new economic superpowers**
- **Intense international competition for investment**
- **Ireland will be coping with the effects of Climate Change**
- **Need to have world class infrastructure**

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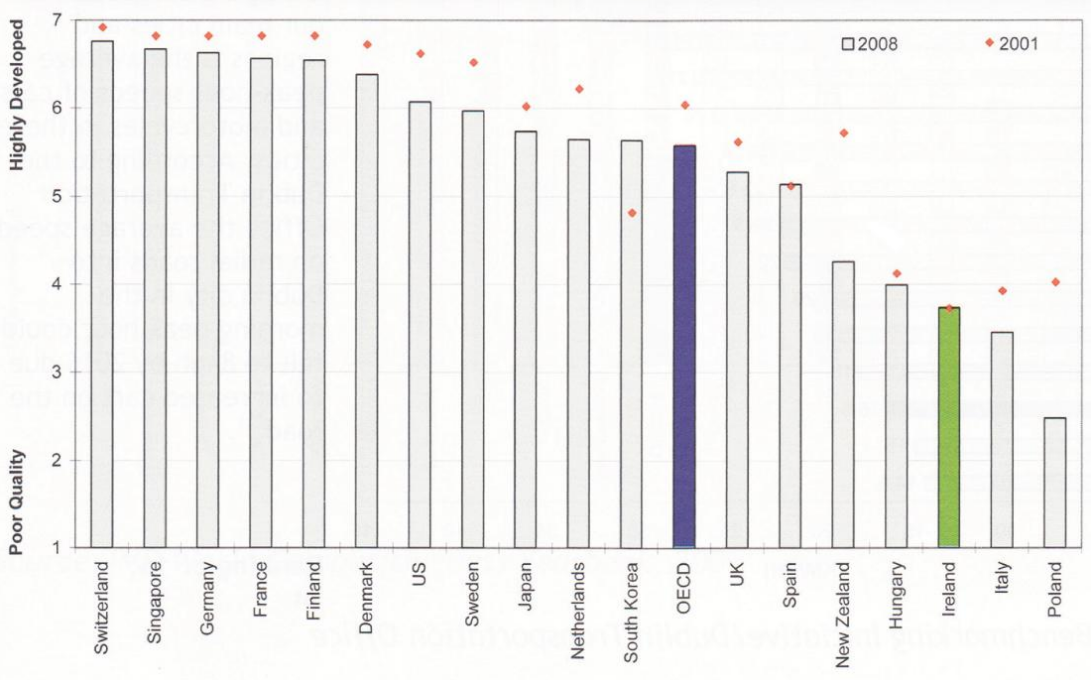
Figure 11.2 Perception of Overall Infrastructure Quality (Scale 1 – 7) 2008



Source: WEF Global Competitiveness Report 2008/09 in Forfás National Competitiveness Council Report 2009

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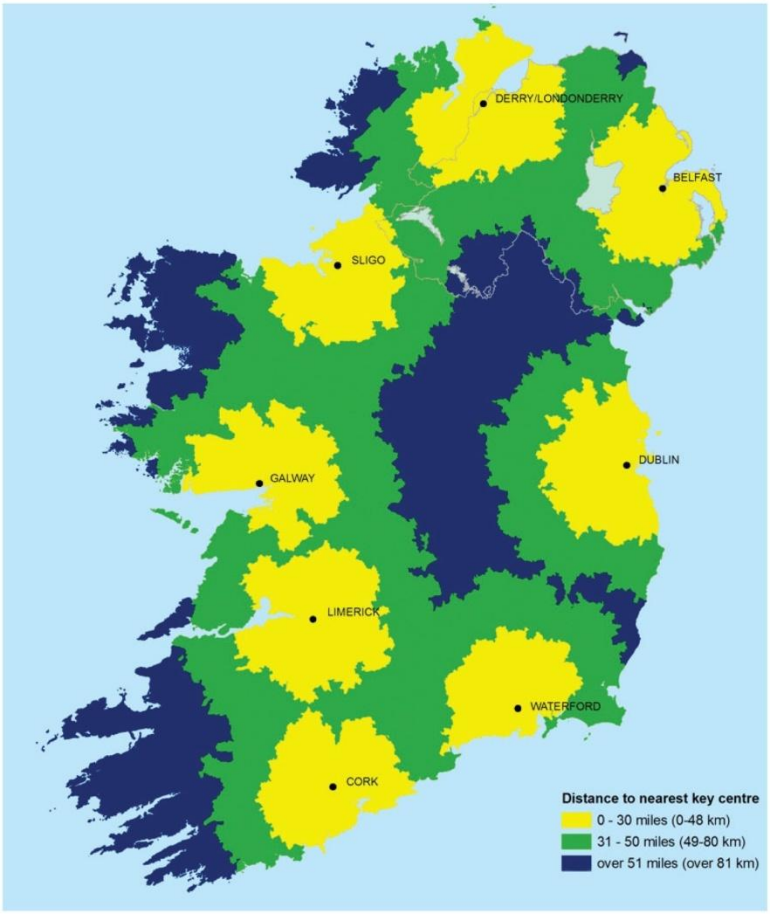
Figure 2.4 Distance by Road to the Largest Settlement in Each of Eight City Regions



Source: Strategic Investment Board NI

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Table 2.1 Population Density Comparison with Other European Cities (per sq km)

Barcelona	16,000
Lyons	9,500
Copenhagen	6,000
Dublin City	4,400
Belfast City	3,400

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Table 2.2 Irish Cities – Present and Projected Population Densities (per sq km)

	2006	2030
Dublin	4,400	6,000
Belfast	3,400	4,500
Cork	3,200	4,300
Limerick	2,500	3,300
Derry/Londonderry	2,000	2,700
Sligo	1,600	2,100
Galway	1,400	1,900
Waterford	1,100	1,500

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Table 2.4 Distribution of a Population of Eight Million (Catchments with a 65km Radius)

Dublin	2.4m
Belfast	1.5m
Cork	0.82m
Limerick	0.72m
Waterford	0.64m
Galway	0.58m
Derry/Londonderry	0.45m
Sligo	0.35m

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"Half the population of the island will be located in the Dublin-Belfast Corridor including the Newry-Dundalk gateway, with a population density five times greater than the rest of the island"

Transport

Key Recommendations

1. Improve transport connections, including high speed rail, between Dublin and Belfast
2. Develop a second transport corridor linking Cork, Limerick and Galway
3. Improve the motorway network to meet increased traffic flows between the 8 principal cities and links to ports and airports
4. Make capacity available in Dublin Port by relocating the Oil Zone to a new port with pipelines for aviation fuel to Dublin Airport
5. Develop Dublin Airport as a major international hub to improve worldwide connectivity for business on the island

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Table 3.2 Motorway Standard

4-Lane Motorway	Dublin–Belfast[9]
	Dublin–Cork
	Dublin–Limerick
3-Lane Motorway	Dublin–Galway
	Dublin–Waterford
	Cork –Limerick
	Limerick–Galway
	Galway–Sligo
2-Lane Motorway	Dublin–Derry/Londonderry
	Sligo–Derry/Londonderry
	Belfast–Derry/Londonderry

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Table 3.3 Traffic Volumes

	2007	2030
Hillsborough	39,500	52,500
Loughbrickland	19,060	25,000
Newry Bypass	26,190	35,000
Drumleck	28,790	54,000
Dunleer Bypass	31,310	58,000
Balbriggan	51,820	96,000

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Table 3.4 Inter-urban Journeys 1999-2007 – Annual Journeys (000s)

	1999	2007	Ratio
Dublin - Belfast [11]	5628	9736	1.7
Dublin - Cork	3572	5007	1.4
Dublin - Galway	1003	1583	1.6
Dublin - Waterford	899	1374	1.5
Dublin - Sligo	517	1239	2.4
Belfast – Derry/Londonderry	612 (1997)	1117	1.8
Dublin - Limerick	705	738	1.0
Total	**12,936**	**20,794**	**1.6**

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Table 3.8 Travel in City Regions

	Bus or Train	Car
Dublin	31%	69%
Cork	8%	92%
Limerick	5%	95%
Galway	6%	94%
Waterford	4%	96%
Sligo	2%	98%

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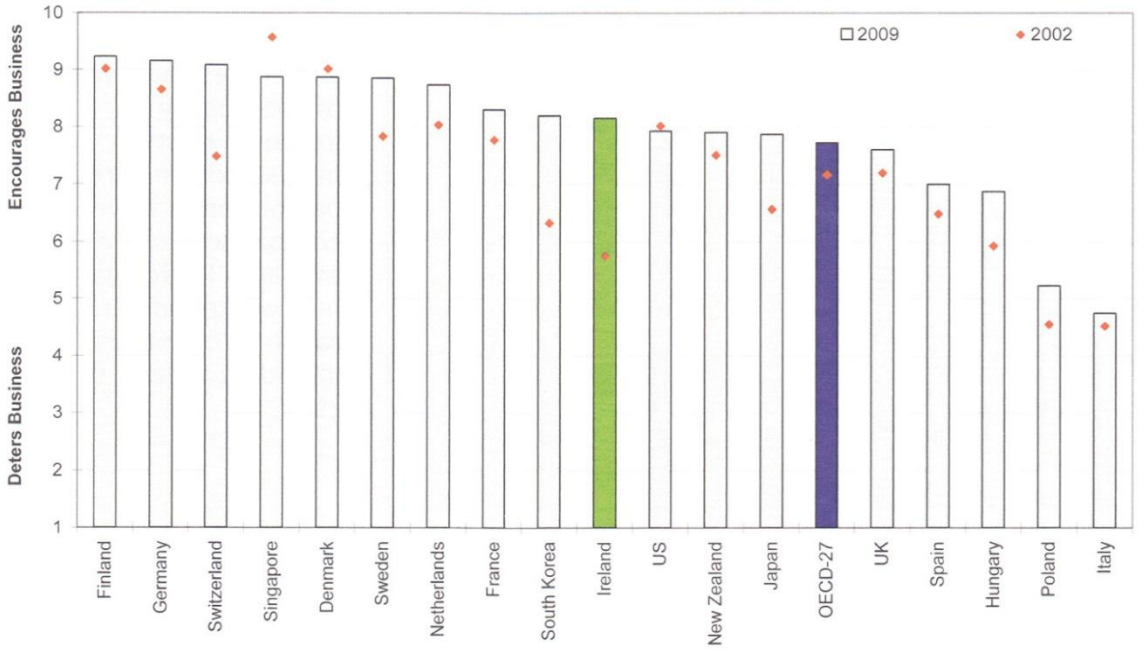
Figure 3.4 Perceptions of Quality of Air Transportation (Scale 1-10) 2009



This chart measures executives' perceptions of the quality of Ireland's air transportation infrastructure. Ireland's score has improved significantly in recent years. A second terminal at Dublin airport, due to open in 2009, should further improve Ireland's score.

Source: IMD World Competitiveness Yearbook, 2009 in Forfás National Competitiveness Council Annual Report 2009

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Table 3.12 Passenger Traffic – 2008

Airport	Passenger No	Air Traffic Market Share
Dublin	22m	62%
Belfast International	5m	14%
Shannon	3m	9%
Cork	3m	9%
Belfast City	2.5m	5%

Energy

Key Recommendations

1. Prioritise investment in R & D in marine renewables and smart grid technologies
2. Determine the optimum share that gas, coal and nuclear should contribute to the non-renewable segment of electricity generation
3. Prioritise the location of new wind farms adjacent to the existing high tension grid
4. Increase energy security by providing gas storage equivalent to 20% of annual usage
5. Make district heating a requirement for all new high density developments

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Figure 4.6 Gas Network

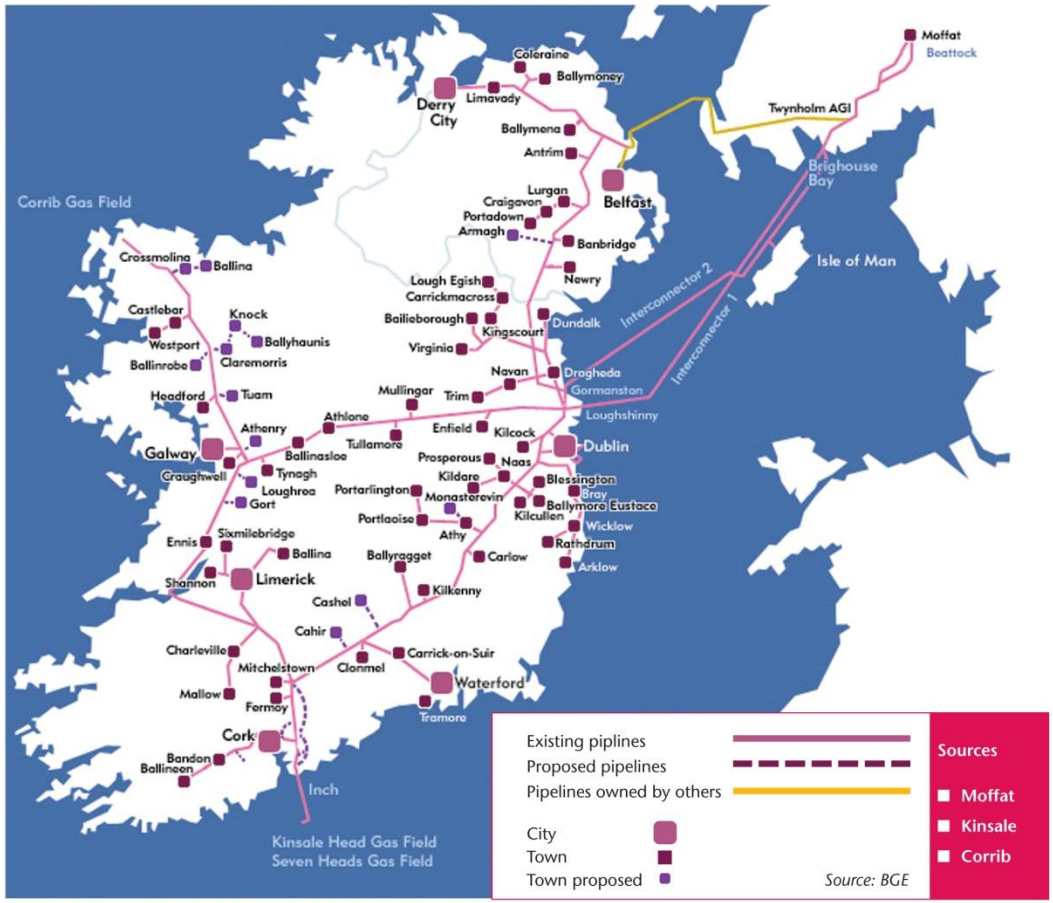

Figure 4.8 European Gas Storage Comparison

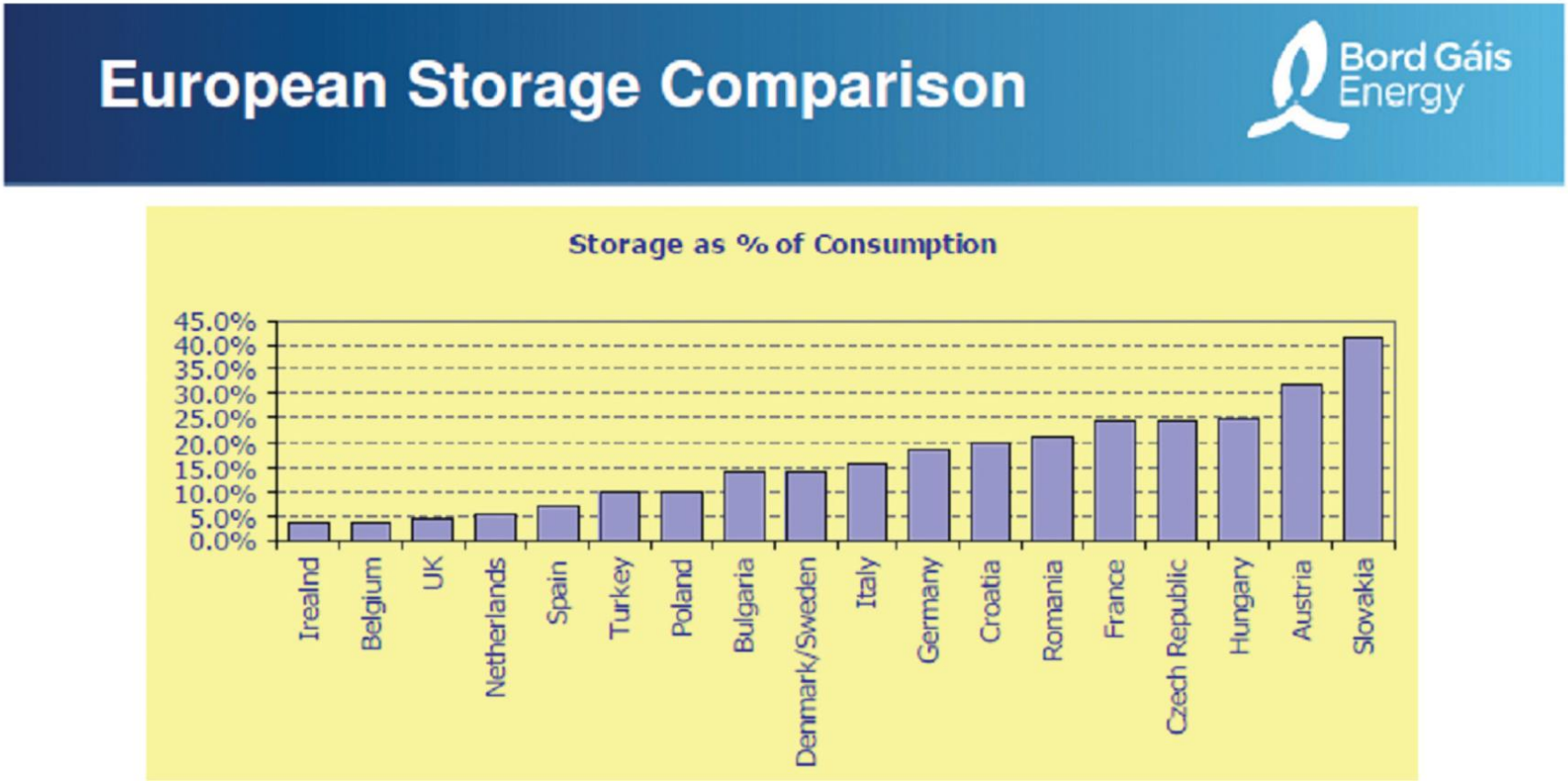

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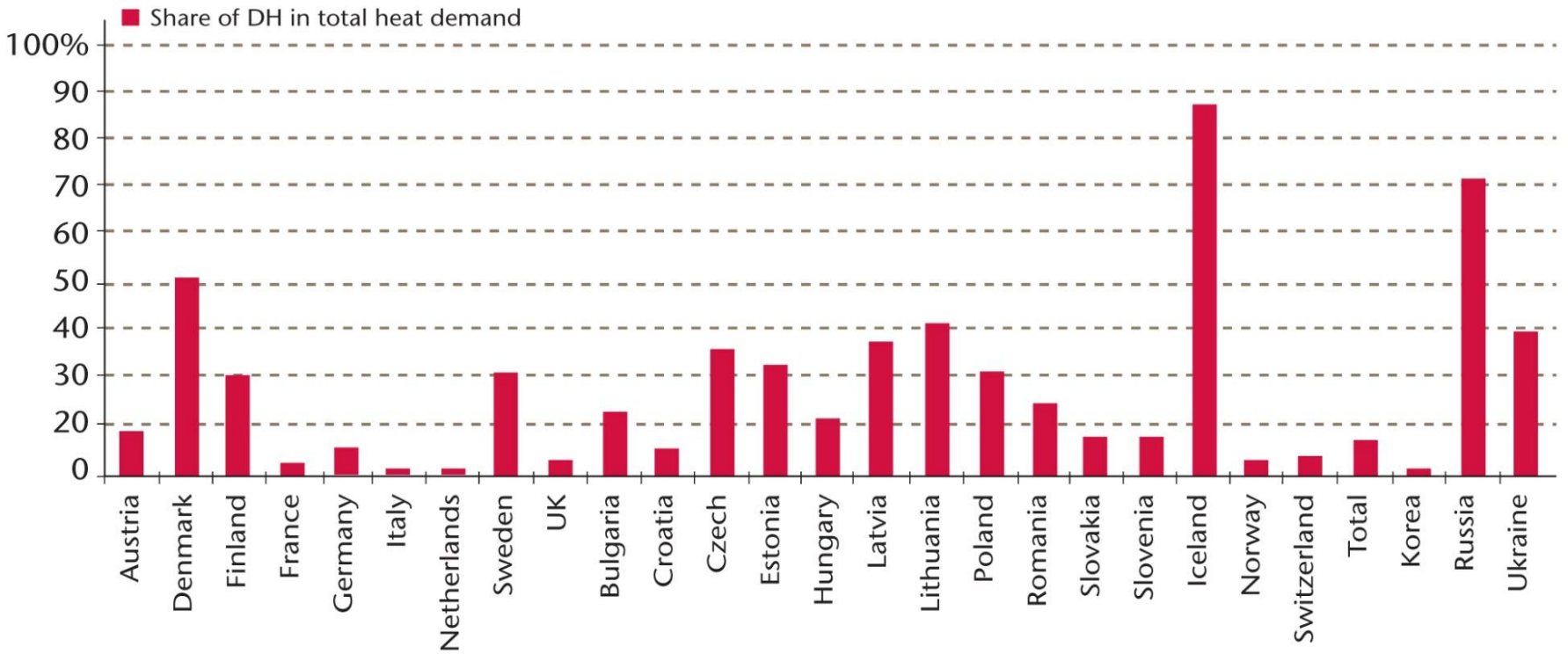
Figure 4.11 Share of District Heating in Total Heat Demand



Source: Euroheat & Power, 2007; (Ireland's share is negligible)

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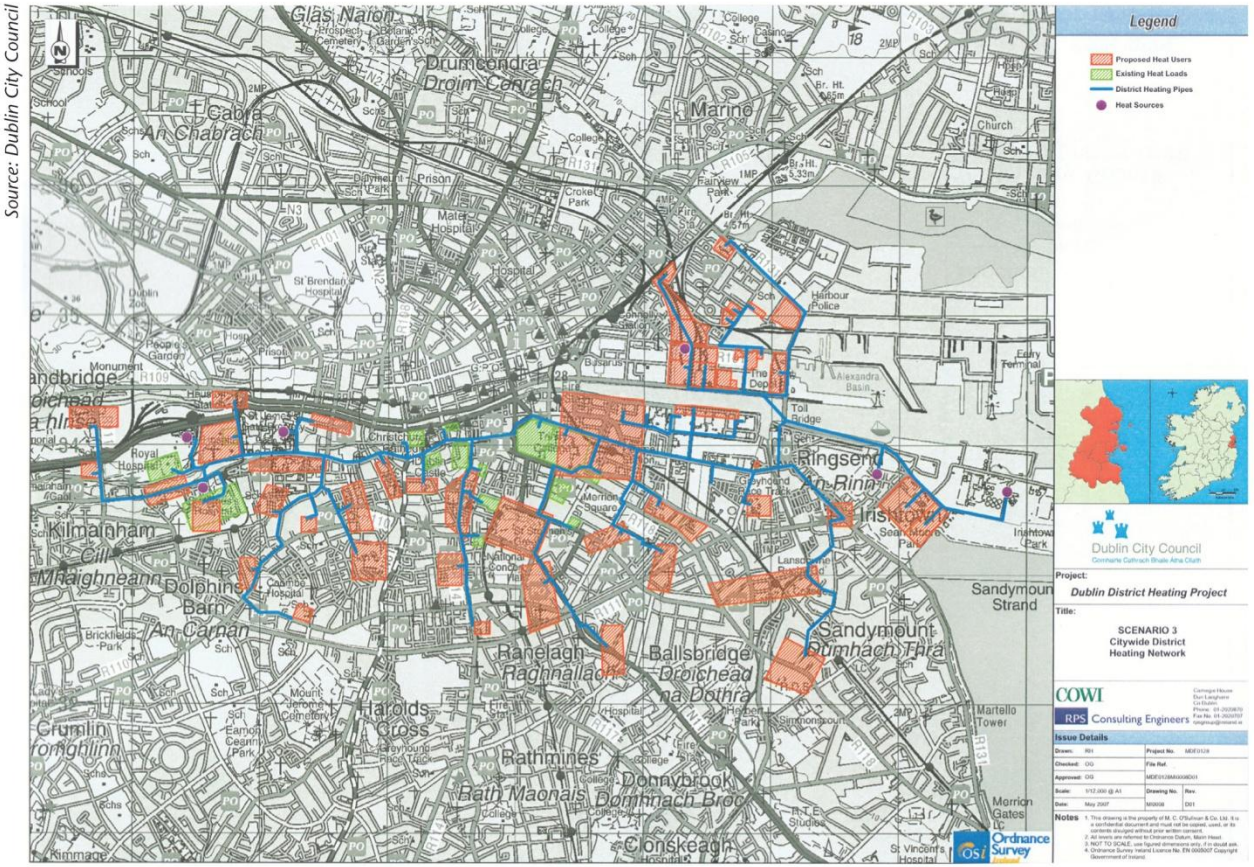
Figure 4.12 Proposed District Heating Network for Dublin City

Source: Dublin City Council



Environment

Key Recommendations

1. Base development plans for the 8 city regions on sustainable principles
2. Manage demand for water with an emphasis on conservation, loss reduction, metering and an economic charge
3. Develop a shared water mains network which will allow for bulk transfer of water between sources of supply and population centres
4. Establish waste to energy plants to cater for residual waste from city regions

Climate Change

Key Recommendations

1. Increase the energy efficiency of residential and commercial buildings
2. Develop non-greenhouse gas emitting baseload electricity generation, coal or gas with carbon capture and storage and nuclear power
3. Protect cities in coastal areas and river basins against flood damage and rising sea levels
4. Ensure the protection of critical infrastructure vulnerable to climate change

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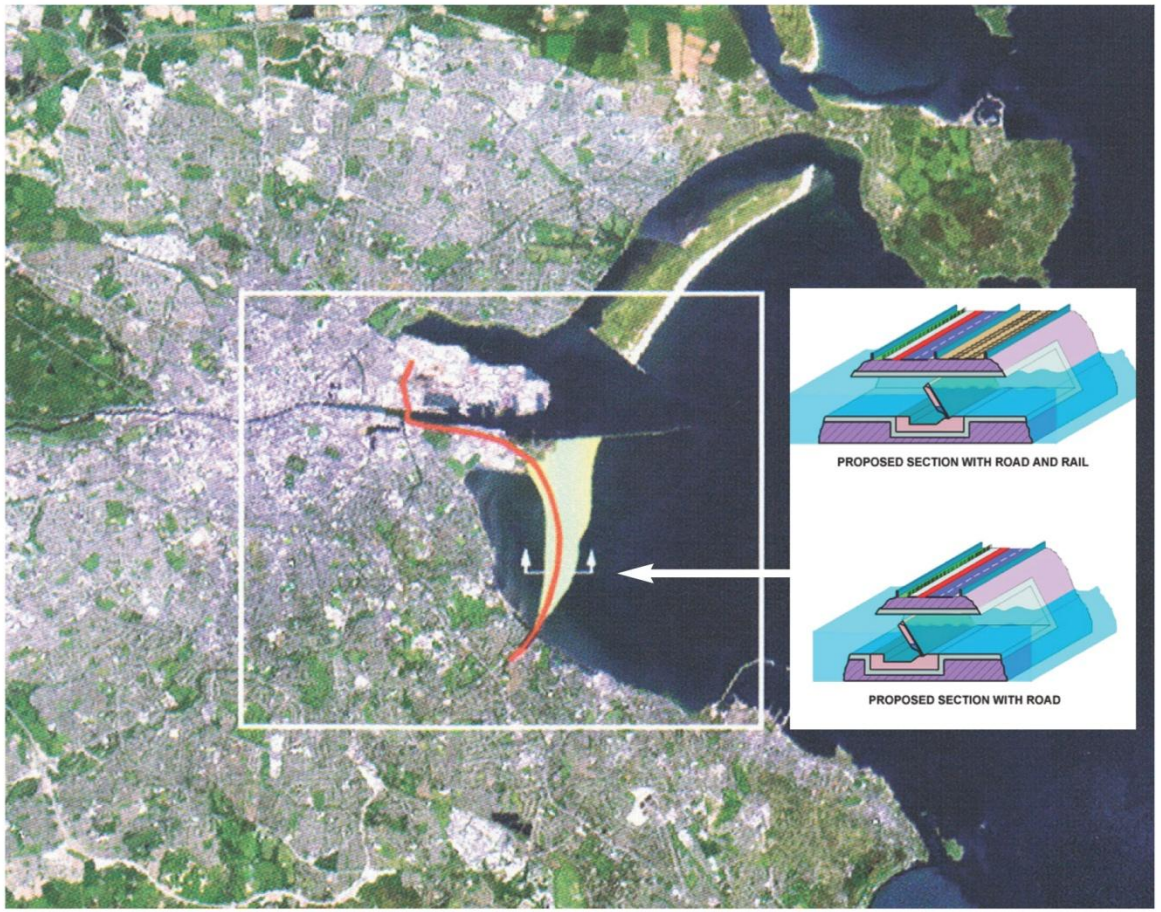
Figure 6.4 Section of Tidal Barrier for Dublin Bay with Eastern Bypass



Source: Dublin City Council

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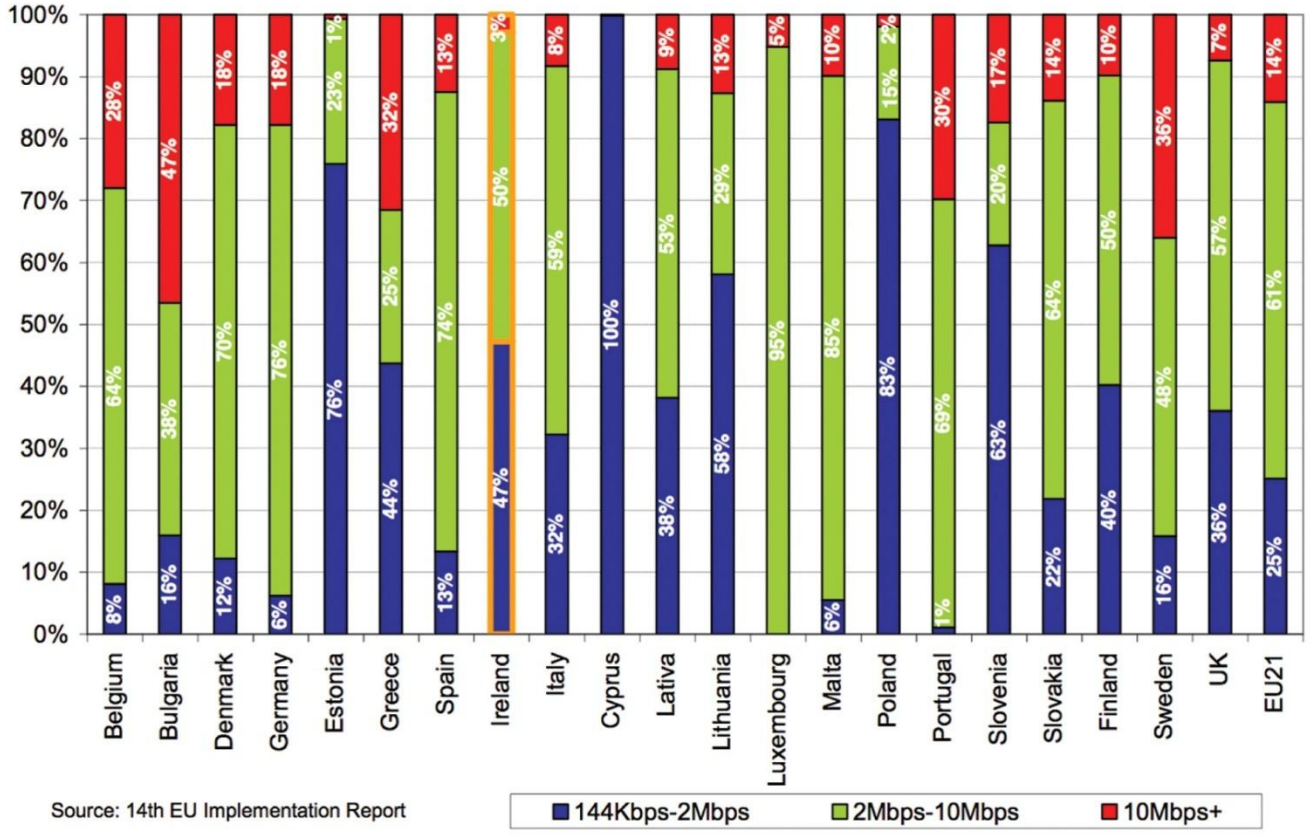
Figure 7.1 Fixed Broadband Lines by Speed, January 2009



Source: ComReg Key Data Q1 2009

Enterprise

Key Recommendations

1. Encourage the development of specialised industrial clusters and innovation hubs in each city
2. Maximise the enterprise opportunities arising from Ireland's climate advantage
3. Support R & D in higher education institutions

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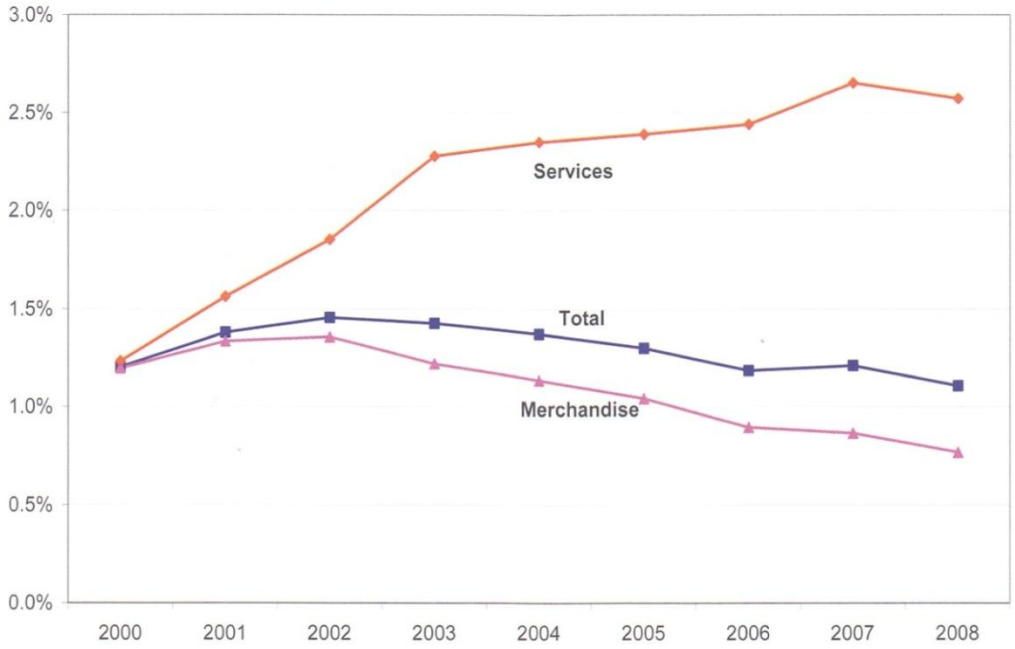
Figure 8.1 Ireland's Share of World Trade: Overall, Merchandise and Services (2000-2009)



Ireland's share of merchandise trade has fallen gradually, while our share of services trade (a smaller but growing component of world trade) continues to grow. In 2008 services exports accounted for 45.4% of total Irish exports compared to 21% in 2000.

Source: World Trade Organisation

Source: Forfás National Competitiveness Council Annual Report 2009

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Table 8.3 Sectoral Concentration of New FDI Projects

Business Sector	City
Business services *(including software and financial)*:	Dublin 69%; Cork 58%; Belfast 54%
Pharmaceuticals/medical devices:	Cork 32%; Galway 28%; Limerick 28%
Electronics/engineering:	Belfast 31%; Galway 17%; Dublin 11%

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Table 8.7 Location of FDI R&D Projects

Dublin	50%
Cork	16%
Limerick	10%
Galway	10%

Economic Assessment

Key Recommendations

1. Finance infrastructure from the Exchequer, public private partnerships, capital markets and an Island of Ireland Infrastructure Bank and the EIB
2. Develop a framework to allow private sector to increase its share of investment in the provision of infrastructure

ANNEX 1
Indicative Costs of Projects having an Island Emphasis

The following are indicative costs of additional investment projects over the next 20 years recommended in this report.

Project	Cost
Dublin–Belfast High-Speed Rail Track and Trains:	**€2.5bn**
Motorway Development: 200km fourth lane to motorway and 500km third lane to motorway	**€5.0bn**
Water Mains Network: Water mains linking Shannon and Lough Neagh to Dublin and Belfast including water treatment plants.	**€1.5bn**
Information Highway: High-speed large capacity information highway linking the eight City Regions, including fibre to home.	**€1.5bn**
District Heating Pipe Network in Cities:	**€250m**