

Environment

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Environment

- The total number of registered vehicles has increased by 75% over the period 1990-2002. Related CO₂ emissions from Road Transport have increased by 134% in the same period.
- Greenhouse gas emissions have increased by 29% over the period 1990-2002.
- Acid rain precursors emissions have decreased by 16% over the period 1990-2002.
- Each household produced on average over one tonne of waste per annum in 2002.
- 21% of municipal waste in Ireland was recovered in 2002, a significant improvement on the 13% in 2001.
- Ireland's total primary energy requirement in 2002 has increased by 59% since 1990.
- The percentage of land area under forest has increased by 38% over the period 1990-2002.

Introduction

Ireland's record rate of economic development in recent years has caused an acceleration of pressures on the environment. This follows a period of several decades during which population, urbanisation and agricultural intensification have given rise to gradually increasing environmental pressures.

Awareness of the necessity for environmental protection has grown substantially in the last number of years. There is increasing concern regarding environmental pollution in all of its aspects.

This chapter contains data on a number of these direct and indirect pressures on the environment, details of which are drawn primarily from the Environmental Protection Agency (EPA).

Table 18.1 contains information on the land areas afforested, together with the associated levels of carbon sinks (changes in forest and other woody biomass stocks). Forests absorb carbon dioxide from the atmosphere and store it in the biomass until the eventual release as a result of burning or timber decay.

Sources of energy by fuel type and energy consumption over the period 1980-2002, which give an indication of the needs of the Irish economy for energy and how they are sourced, are given in Tables 18.3-18.4. The Transport sector accounts for an increasing proportion of energy consumption and Table 18.2 details the growth in vehicle numbers and CO₂ emissions. An example of a pressure indicator derived from economic prosperity and economic activity has been included in Table 18.2, namely the number of cars per 1,000 population.

The next eight tables (Tables 18.5-18.12) deal with Greenhouse gases, Acid rain agents, environmental pressures over time, such as river quality and the generation of waste. Tables 18.5-18.8 give a picture as to where Ireland has progressed vis-à-vis emissions of greenhouse gases and acidifying agents.

Definitions

TOE = Tonnes of Oil Equivalent

HFCs = Hydrofluorocarbons

PFCs = Perfluorocarbons

SF₆ = Sulphur hexafluorides

ug/m³ = Microgram per cubic metre

Table 18.1 Land areas afforested and CO₂ sinks

	Hectares public	Hectares private	Hectares total	Hectares annual change	CO ₂ sinks kilotonnes
1980	291,086	102,221	393,307	–	–
1981	297,185	102,496	399,681	6,374	–
1982	303,201	102,994	406,195	6,514	–
1983	308,899	103,321	412,220	6,025	–
1984	314,091	103,794	417,885	5,665	–
1985	318,716	104,411	423,127	5,242	–
1986	323,404	106,691	430,095	6,968	–
1987	328,799	109,645	438,444	8,349	–
1988	335,910	114,241	450,151	11,707	–
1989	342,539	122,738	465,277	15,126	–
1990	349,209	131,885	481,094	15,817	-450.11
1991	357,064	143,177	500,241	19,147	-422.95
1992	364,629	152,311	516,940	16,699	-318.05
1993	371,456	161,482	532,938	15,998	-380.85
1994	378,078	174,319	552,397	19,459	-407.25
1995	384,445	191,662	576,107	23,710	-428.68
1996	388,871	208,217	597,088	20,981	-420.15
1997	389,722	218,800	608,522	11,434	-497.91
1998	392,648	228,802	621,450	12,928	-573.62
1999	393,539	240,579	634,118	12,668	-500.51
2000	396,725	253,088	649,813	15,695	-407.33
2001	397,042	268,235	665,277	15,464	-1,007.02
2002	397,361	282,970	680,331	15,054	-1,319.59
2003	397,489	291,939	689,428	9,097	–

Source: Forest Service

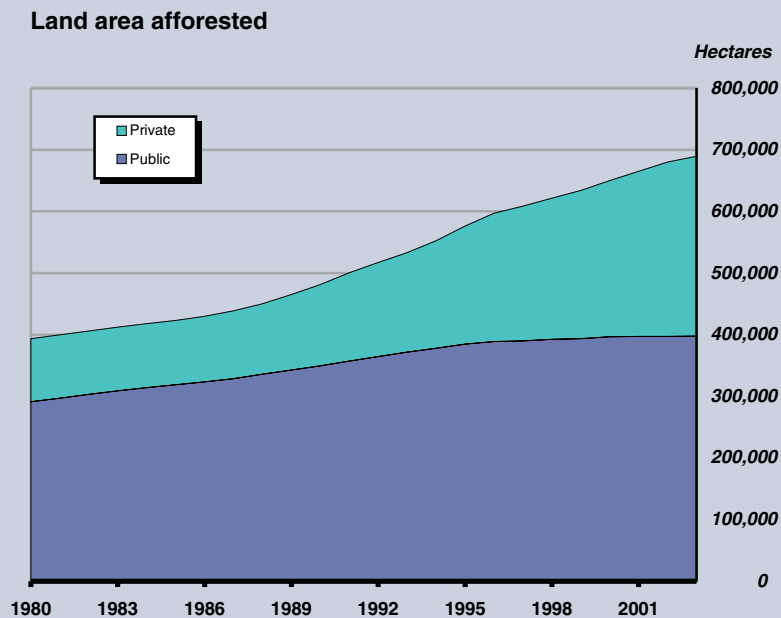


Table 18.2 Environmental pressures – transport

	Number of private cars	Total number of vehicles	Population	Number of private cars per 1,000 of population	CO ₂ emissions from road transport kilotonnes
1979	682,958	853,211	3,368,200	203	–
1980	734,371	911,031	3,401,000	216	–
1981	774,594	949,819	3,443,400	225	–
1982	709,000	882,140	3,480,000	204	–
1983	718,555	897,381	3,504,000	205	–
1984	711,098	906,109	3,529,000	202	–
1985	709,546	914,758	3,540,000	200	–
1986	711,087	922,484	3,540,600	201	–
1987	736,595	959,753	3,546,500	208	–
1988	749,459	981,296	3,530,700	212	–
1989	773,396	1,019,560	3,509,500	220	–
1990	796,408	1,054,259	3,505,800	227	4,642
1991	836,583	1,105,545	3,525,700	237	4,927
1992	858,498	1,126,473	3,554,500	242	5,330
1993	891,027	1,151,238	3,574,100	249	5,383
1994	939,022	1,202,273	3,585,900	262	5,523
1995	990,384	1,262,503	3,601,300	275	5,954
1996	1,057,383	1,338,616	3,626,100	292	6,657
1997	1,134,429	1,432,330	3,660,600	310	7,269
1998	1,196,901	1,510,853	3,704,900	323	8,283
1999	1,269,245	1,608,156	3,744,700	339	9,149
2000	1,319,250	1,682,221	3,786,900	348	9,583
2001	1,384,704	1,769,684	3,838,900	361	10,300
2002	1,447,908	1,850,046	3,917,200	370	10,869

Source: Department of the Environment, Heritage and Local Government; CSO and Environmental Protection Agency

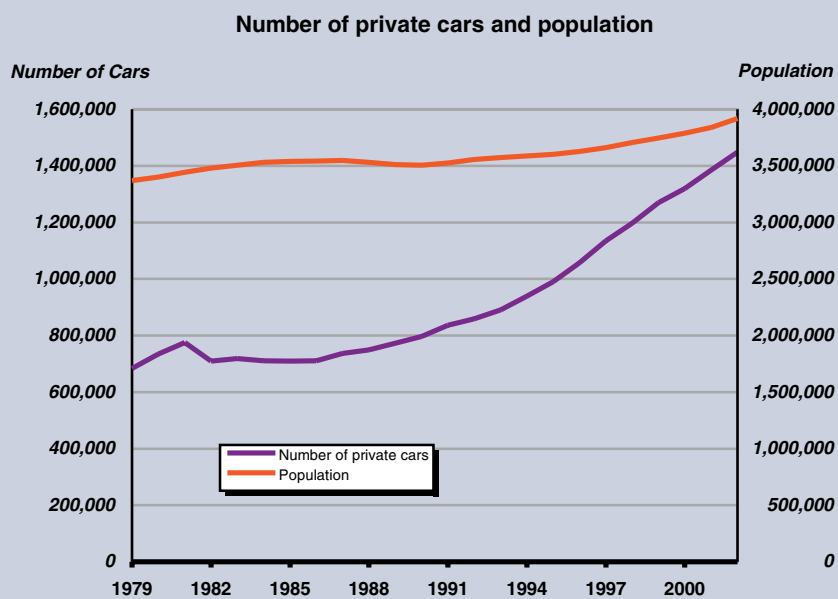


Table 18.3 Total primary energy requirement by fuel type

	Millions of tonnes of oil equivalent (TOE)							Percentages						
	1980	1985	1990	1995	2000	2001	2002	1980	1985	1990	1995	2000	2001	2002
Coal	0.73	1.05	2.16	1.92	1.99	2.04	1.98	9.1	13.1	22.9	17.9	14.2	13.8	13.5
Peat	1.17	1.45	1.36	1.21	0.80	0.88	0.86	14.6	18.0	14.4	11.3	5.7	6.0	5.8
Oil	5.61	3.89	4.29	5.45	7.92	8.44	8.26	69.8	48.4	45.5	50.9	56.5	57.2	56.1
Natural Gas	0.46	1.59	1.45	1.92	3.04	3.14	3.33	5.7	19.8	15.4	17.9	21.7	21.3	22.6
Renewables	0.07	0.06	0.17	0.20	0.26	0.26	0.29	0.9	0.7	1.8	1.9	1.9	1.8	2.0
Total	8.04	8.04	9.43	10.7	14.01	14.76	14.72	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Sustainable Energy Ireland

Table 18.4 Final energy consumption by sector

	Millions of tonnes of oil equivalent (TOE)							Percentages						
	1980	1985	1990	1995	2000	2001	2002	1980	1985	1990	1995	2000	2001	2002
Transport	1.73	1.72	2.03	2.46	3.90	4.31	4.46	27.8	27.9	28.2	31.1	36.8	38.6	39.5
Residential	1.94	2.09	2.19	2.18	2.58	2.68	2.68	31.1	33.9	30.4	27.6	24.3	24.0	23.7
Industry	1.96	1.68	1.72	1.75	2.27	2.25	2.20	31.5	27.2	23.9	22.1	21.4	20.2	19.5
Agriculture	n/a	n/a	0.25	0.29	0.33	0.33	0.33	n/a	n/a	3.5	3.7	3.1	3.0	2.9
Services	0.60	0.68	1.01	1.23	1.53	1.59	1.62	9.6	11.0	14.0	15.5	14.4	14.2	14.4
Total	6.23	6.17	7.20	7.91	10.61	11.16	11.29	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Department of Public Enterprise

Final Energy Consumption by Sector

(Agriculture energy consumption only available after 1986)

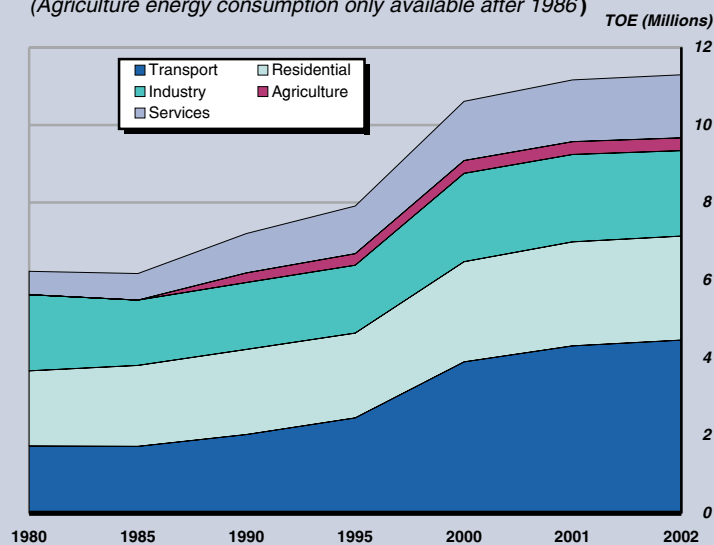


Table 18.5 Greenhouse gas emissions

	<i>Kilotonnes</i>							
	1990	1996	1997	1998	1999	2000	2001	2002
Carbon Dioxide (CO ₂)	31,797	35,954	38,312	40,250	42,133	44,159	46,460	45,808
Methane (CH ₄)	567	608	617	618	614	609	598	609
Nitrous Oxide (N ₂ O)	31	33	34	34	35	35	34	32
Total	32,394	36,595	38,963	40,902	42,782	44,803	47,092	46,449

Source: Environmental Protection Agency

Table 18.6 Greenhouse gas emissions, CO₂ equivalent

	<i>CO₂ equivalent kilotonnes</i>							
	1990	1996	1997	1998	1999	2000	2001	2002
Carbon Dioxide (CO ₂)	31,797	35,954	38,312	40,250	42,133	44,159	46,460	45,808
Methane (CH ₄)	11,900	12,769	12,955	12,970	12,885	12,785	12,563	12,795
Nitrous Oxide (N ₂ O)	9,542	10,264	10,422	10,652	10,828	10,760	10,401	9,741
HFCs, PFCs and SF ₆	179	262	342	257	411	547	594	531
Total	53,418	59,249	62,031	64,128	66,257	68,251	70,018	68,875
Base year 1990=100	100	111	116	120	124	128	131	129

Source: Environmental Protection Agency

Greenhouse gas emissions

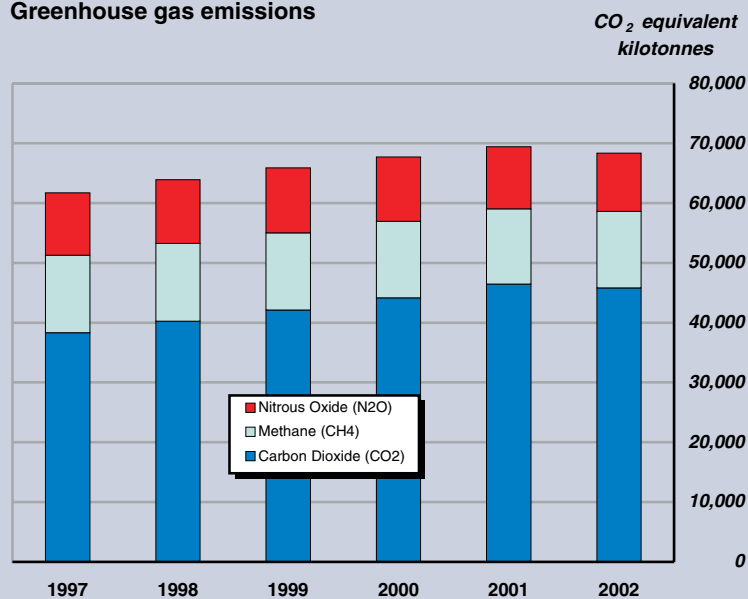


Table 18.7 Acid rain and ozone precursors

	<i>Tonnes</i>							
	1990	1996	1997	1998	1999	2000	2001	2002
Sulphur Dioxide (SO ₂)	185,786	147,380	166,114	176,061	157,369	131,489	125,792	96,246
Nitrogen Oxides (NOX)	122,410	126,710	124,502	128,607	126,334	132,691	134,956	125,257
Ammonia (NH ₃)	112,317	121,941	123,397	126,551	126,987	122,440	122,599	118,973
Volatile Organic Compounds (VOC)	110,940	111,930	115,730	117,740	98,670	90,330	86,990	81,418
Carbon Monoxide (CO)	400,920	306,832	312,159	317,732	285,310	279,571	269,690	254,119
Total	932,373	814,793	841,902	866,691	794,670	756,521	740,027	676,013

Source: Environmental Protection Agency

Table 18.8 Acid rain precursors

	<i>SO₂ equivalent per tonne of gas emitted</i>							
	1990	1996	1997	1998	1999	2000	2001	2002
Sulphur Dioxide (SO ₂)	185,786	147,380	166,114	176,061	157,369	131,489	125,792	96,246
Nitrogen Oxides (NOX)	85,160	88,152	86,616	89,472	87,891	92,313	93,889	87,141
Ammonia (NH ₃)	213,426	229,541	232,282	238,220	239,040	230,481	230,780	223,955
Total	484,372	465,073	485,012	503,753	484,300	454,283	450,461	407,342
Base year 1990=100	100	96	101	104	100	94	93	84

Source: Environmental Protection Agency

Acid rain precursors

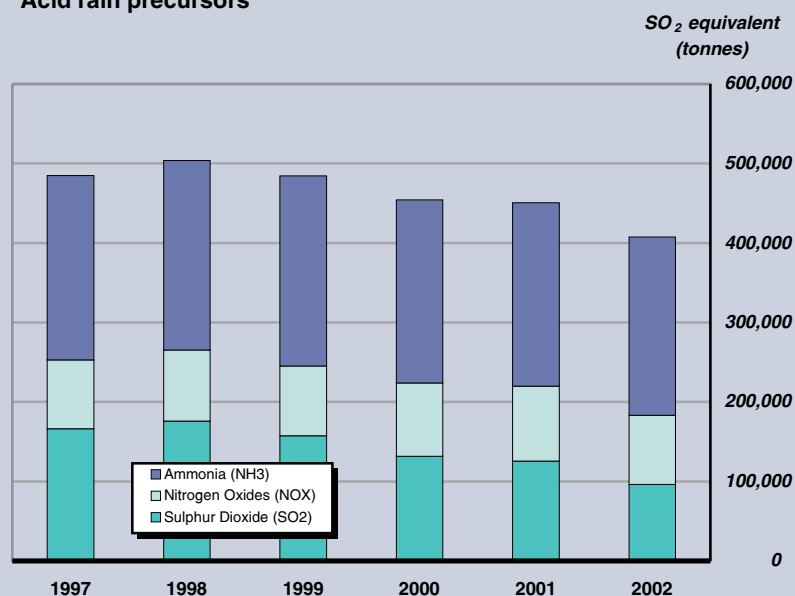


TABLE 18.7

TABLE 18.8

Table 18.9 Lead concentrations and sales of unleaded petrol in Dublin

Location	<i>ug/m³</i>									
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
O'Connell Street	0.2	0.2	0.1	0.1	0.1	0.1	0.04	0.02	0.04	–
College Street	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.05	0.06	0.02
Pearse Street	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.06	0.07	0.08
Branch Road (Dublin Port area)	0.3	0.3	0.4	0.5	0.4	0.3	0.3	0.64	0.53	0.12
Ranelagh	0.1	0.1	0.1	0.1	0.1	0.04	0.04	0.02	0.02	–
Kilbarrack	0.1	0.05	0.1	0.04	0.03	0.02	0.01	0.01	0.01	0.01
Unleaded Petrol (%) of total sales	40	49	57	64	73	80	92	100	100	100

Source: Dublin Corporation

Table 18.10 River quality

	<i>% of channel length</i>			
	1987	1991	1995-1997	1998-2000
Unpolluted	77	71	67	70
Slightly polluted	12	17	18	17
Moderately polluted	10	11	14	12
Seriously polluted	1	1	1	1
Total	100	100	100	100

Source: Environmental Protection Agency

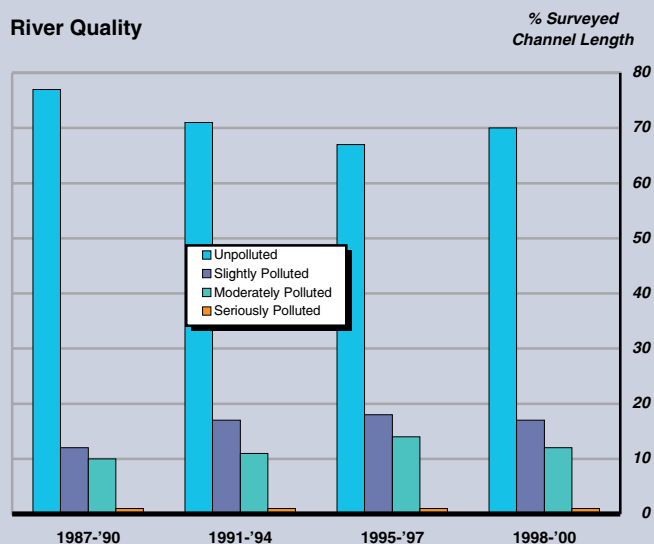


Table 18.11 Total household and commercial waste collected

	Tonnes					
	1984	1993	1995	1998	2001	2002
Household and commercial waste collected	854,866	1,188,312	1,385,439	1,852,450	2,297,603	2,398,769
Base year 1984=100	100	139.0	162.1	216.7	268.8	280.6

Source: Environmental Protection Agency

Table 18.12 Disposal and recovery of household and commercial waste and packaging in 2002

	Paper	Glass	Plastic	Ferrous, aluminium and other metals	Textiles	Organics	Others	Total
Waste quantity landfilled	583,431	100,903	212,684	63,643	55,997	547,204	338,002	1,901,864
Household waste landfilled	288,087	57,272	150,207	47,562	48,324	416,124	286,485	1,294,061
Commercial waste landfilled	295,344	43,631	62,476	16,080	7,674	131,080	51,518	607,803
Waste quantity recovered	262,721	60,109	36,630	8,632	1,291	97,850	29,672	496,905
Household waste recovered	44,002	32,421	7,710	4,365	1,291	35,126	7,687	132,602
Commercial waste recovered	218,719	27,689	28,920	4,267	0	62,724	21,985	364,304
Total Waste Recovered (%)	31.0	37.3	14.7	11.9	2.3	15.2	8.1	20.7
Packaging quantity disposed	254,822	64,354	179,764	53,491	1,404	6,078*	42,824	602,737
Packaging quantity recovered	132,321	58,175	29,344	26,062	0	50,260*	227	296,389
Total Packaging Recovered (%)	34.2	47.5	14.0	32.8	0.0	89.2	0.5	33.0

* Wood

Source: Environmental Protection Agency

Disposal and recovery of household and commercial waste in 2002

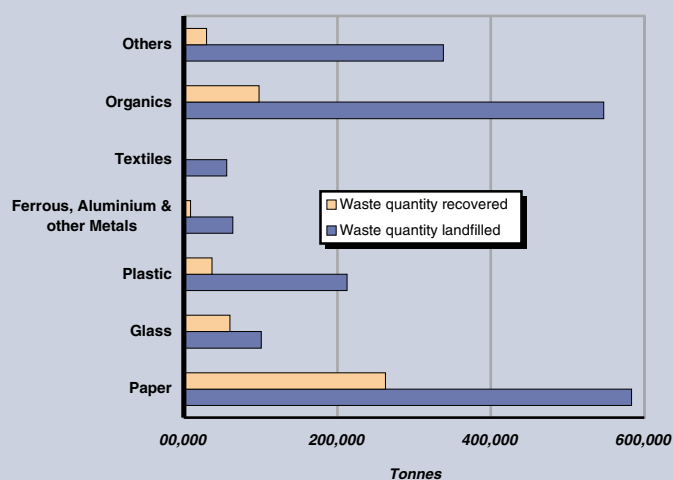


TABLE 18.11
TABLE 18.12

Table 18.13 Rainfall, 2002

Station	Annual amount	% of average ¹	Most in a day	
			Amount	Date
	<i>mm</i>		<i>mm</i>	
Shannon Airport	1,068.9	115	35.6	21 October
Cork Airport	1,538.1	127	34.6	21 November
Malin Head	1,062.5	100	20.2	19 February
Dublin Airport	1,095.6	n/a	74.6	14 November
Casement Aerodrome	1,014.8	143	52.5	14 November
Valentia Observatory	1,922.7	134	41.3	20 November
Kilkenny	1,046.7	129	30.1	08 October
Belmullet	1,318.3	115	33.8	20 October
Connacht Airport	1,463.8	n/a	33.6	20 October
Clones	1,243.1	134	41.6	17 May
Birr	1,029.9	128	26.0	23 January
Mullingar	1,212.6	131	36.0	20 October
Rosslare	1,241.1	142	80.0	24 October

¹ 30 year average 1961-1990
Source: Met Éireann

TABLE 18.13

Percentage of normal rainfall, 2002

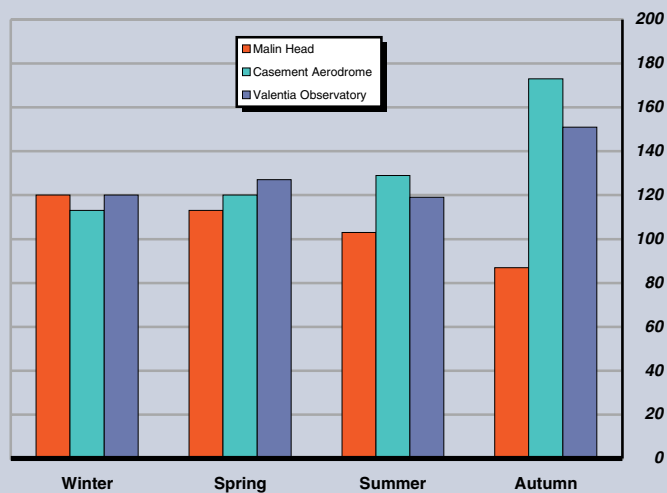


Table 18.14 Temperature, 2002

°C

Station	Daily Mean	Difference from average ¹	Extremes	
			Highest	Lowest
Shannon Airport	11.2	1.0	24.0	-3.8
Cork Airport	10.3	0.8	23.2	-0.9
Malin Head	10.2	0.8	22.2	-0.1
Dublin Airport	10.1	n/a	23.7	-6.6
Casement Aerodrome	10.3	1.0	23.2	-5.5
Valentia Observatory	11.1	0.6	22.4	-1.4
Kilkenny	10.3	0.9	24.9	-7.5
Belmullet	10.6	0.9	23.1	-3.1
Connacht Airport	9.0	n/a	23.4	-4.6
Clones	9.8	0.5	25.6	-5.7
Birr	10.2	0.8	24.9	-7.0
Mullingar	9.9	0.9	25.0	-8.0
Rosslare	11.3	1.2	22.9	0.4

¹ 30 year average 1961-1990
Source: Met Eireann

TABLE 18.14

Difference from normal mean temperature, 2002



Table 18.15 Sunshine, 2002

Station	Daily Mean	% of average ¹	Most in a day	
			Amount	Date
	<i>hours</i>		<i>hours</i>	
Shannon Airport	3.47	100	13.8	04 May
Cork Airport	3.73	98	13.9	04 May
Malin Head	3.68	110	15.0	05 June
Dublin Airport	3.64	93	12.7	05 June
Casement Aerodrome	3.54	96	12.5	26 August
Valentia Observatory	3.39	101	15.4	06 June
Kilkenny	3.51	101	12.2	07 April
Belmullet	3.67	105	13.4	02 August
Connacht Airport	3.27	n/a	13.2	05 July
Clones	3.40	116	12.6	11 May
Birr	3.19	96	11.9	04 May
Mullingar	3.51	101	12.8	21 August
Rosslare	4.37	101	15.2	05 June

¹ 30 year average 1961-1990
Source: Met Éireann

TABLE 18.15

Percentage of normal sunshine, 2002

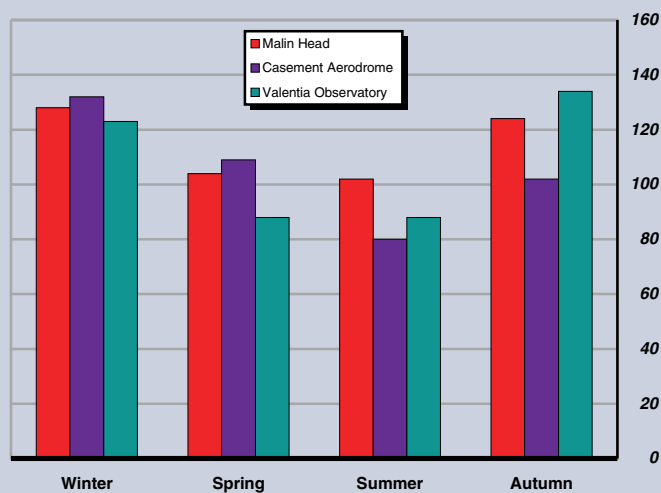


Table 18.16 Number of days in 2002 with various weather conditions

Station	Number of days						
	Rain	Snow	Air frost	Hail	Thunder	Fog	Gale gusts
Shannon Airport	238	3	6	14	7	23	65
Cork Airport	258	6	1	9	4	110	89
Malin Head	251	9	1	36	5	9	180
Dublin Airport	247	5	18	8	4	36	83
Casement Aerodrome	216	3	17	9	10	17	80
Valentia Observatory	269	3	3	15	9	9	92
Kilkenny	246	n/a	27	n/a	n/a	n/a	50
Belmullet	277	8	3	39	6	19	144
Connacht Airport	273	12	14	16	4	168	81
Clones	225	n/a	21	n/a	n/a	n/a	47
Birr	247	n/a	22	n/a	n/a	n/a	45
Mullingar	260	n/a	24	n/a	n/a	n/a	39
Rosslare	215	0	0	4	3	39	116

Averages¹

Station	Number of days						
	Rain	Snow	Air frost	Hail	Thunder	Fog	Gale gusts
Shannon Airport	214	2.0	25.4	21.7	6.3	31.8	90
Cork Airport	204	5.6	24.0	8.8	3.7	99.5	101
Malin Head	237	3.3	11.0	48.4	5.9	11.8	187
Dublin Airport	185	4.5	24.3	9.5	4.1	50.5	89
Casement Aerodrome	185	5.3	41.3	10.7	4.8	25.9	92
Valentia Observatory	239	0.8	13.9	25.5	7.1	8.9	135
Kilkenny	192	4.1	53.0	10.4	5.0	44.4	61
Belmullet	249	2.3	16.7	45.1	5.5	16.6	132
Connacht Airport	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Clones	218	10.8	46.1	15.5	5.7	46.8	88
Birr	204	6.6	45.7	8.7	5.2	29.9	71
Mullingar	214	8.4	50.0	12.1	5.3	52.6	76
Rosslare	176	1.8	8.0	11.8	6.7	38.5	122

¹ 30 year average 1961-1990
Source: Met Eireann

TABLE 18.16

Ireland's annual temperature deviation from 1961-1990 average (9.65 °C) with 15 year smoothed average superimposed

