



Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland, 1987). In this regard it is vital that environmental issues be considered within policy and decision-making across all economic sectors. This chapter focuses on scenarios of future economic growth and social change and their contribution to sustainable development. Projections for environmental parameters including emissions to air and waste generation are outlined, presenting a picture of what the future might look like for the environment, identifying pressure points, and thereby highlighting the need for action.

A number of potential scenarios are also analysed to investigate the effectiveness of policy instruments on environmental outcomes. Specifically, these examine potential policy measures to meet the biodegradable municipal waste targets specified under the Landfill Directive.

## SECTORAL ANALYSIS AND FUTURE OUTLOOK

# 15

## Introduction

Previous state of the environment reports assessed the state of the environment based on best available information from a wide range of sources, but there was limited capacity to assess how existing socioeconomic activity or new developments might impact future environmental quality. To bridge that gap, the EPA is funding research to examine how socioeconomic activity will contribute to future emissions of pollutants and waste generation. In the same way that economists forecast macroeconomic indicators, such as GNP growth, unemployment and inflation, the objective of the research is to produce forecasts of environmental indicators (e.g. emissions) and to enable analysis of the potential environmental impact of various scenarios.

The Economic and Social Research Institute (ESRI) is undertaking the three-year research project, which began in August 2006. The project involves modelling how the evolution of activity across the economy and society affects waste generation and emissions of potential pollutants. The model, which is called ISus (Irish Sustainable Development Model), covers in excess of 25 potential pollutants (to air, water and waste) emanating from 20 economic sectors, including the residential sector (O'Doherty *et al.*, 2007). The ISus model utilises a wide range of economic and environmental data including the ESRI's latest macroeconomic projections, as published in its *Medium Term Review 2008–2015* (FitzGerald *et al.*, 2008), and is capable of scenario analysis to highlight the environmental implications of various measures in order to better inform decisions that affect the environment: for example, investigation of the implications for

waste management of a potential increase in the landfill levy.

Though the research is not yet complete, it is sufficiently advanced to allow presentation of some preliminary analysis. The results are presented here to highlight potential environmental issues in the decade ahead, and also to demonstrate how the research can inform environment-related decisions.

## Baseline Scenario – 'Business as Usual'

The 'business-as-usual' scenario presents a picture of what the future might look like for the environment if most existing trends, behaviours and policies remain unchanged. In reality circumstances will change, as government policies are implemented (e.g. climate change policies) and behaviours change (e.g. increased recycling). The benefit of undertaking a business-as-usual scenario analysis is that it identifies the pressure points on the environment, some of which may not be obvious or known, and thereby highlights the need for action.

Underpinning the ISus environmental projections are the ESRI's macroeconomic forecasts (FitzGerald *et al.*, 2008), in particular its 'benchmark forecast'. The main features of the latter are as follows.

- GNP growth to reach on average 3.5 per cent a year for the first half of the next decade, and GNP per capita to grow by 2.5 per cent a year.
- Personal consumption to continue to grow strongly at over 3 per cent per annum beyond 2010.
- Employment to grow by an average of 1.2 per cent per annum between 2010 and 2015. However, the unemployment rate is expected to average 6.2 per cent of the labour force.
- Moderate output growth from the industrial sector averaging 2.3 per cent per annum between 2010 and 2015.
- Output of the building and construction sector is anticipated to grow by less than 1 per cent per annum between 2010 and 2015. House completions are forecast to average 48,000 per annum, compared to an average of 63,000 in 2005–2010.



- Strong growth in the market services sector, in particular business and financial services where 6 per cent per annum average growth in output is forecast for 2010–2015.
- An assumption that a carbon levy will be introduced on all carbon dioxide emissions not regulated by the EU's Emissions Trading Scheme (ETS) at a rate equal to the projected ETS permit price (€20/t of carbon dioxide in 2010, rising to €38 in 2020 in real terms).



Table 15.1 lists the 20 sectors covered by the ISus model. Detailed information on the model itself is available at [www.esri.ie/research/research\\_areas/environment/isus](http://www.esri.ie/research/research_areas/environment/isus). The 'business-as-usual' scenario provides estimates of environmental performance to the year 2025. In some instances it may take many

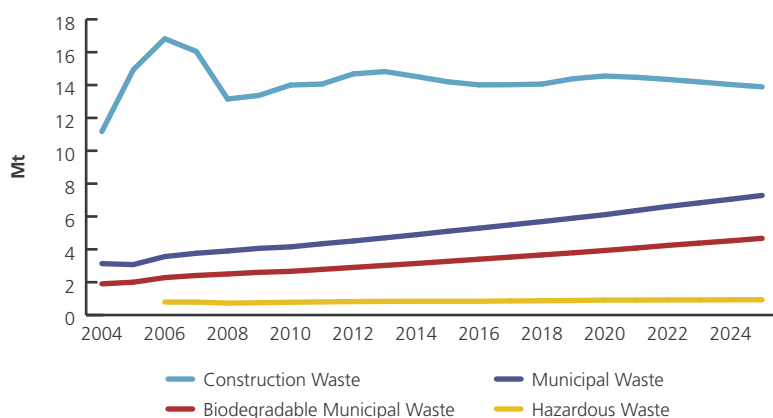
years for the effect of a particular activity or policy measure to become appreciable, hence the need to consider such a long time horizon. The ISus projections are presented as four- and five-year averages, as the model's strength is in forecasting trends over time rather than individual year variations.

## Waste Generation and Management

The projections on waste generation and management are based on forecasts of population growth, the level of economic activity, sector performance, and recent trends in waste management behaviour (see FitzGerald *et al.*, 2008 for further details). The waste projections are presented in Table 15.2 and Figure 15.1, which indicate that over the next decade total waste generation is forecast to grow by in excess of 3 per cent per annum. The one area where waste is anticipated to decline substantially is the construction sector, where collected waste is anticipated to fall from 16.8 Mt in 2006 to just over 14 Mt per annum for the next decade. The reduced tonnage is attributable to lower construction activity rather than improvement in rates of waste generation. Substantial growth is anticipated in municipal waste generation. A population growing at 1 per cent per annum will contribute to that growth; however, waste per person is expected to increase from 0.84 t in 2006 to 1.15 t by 2020 – a phenomenal increase. The growth in waste per person can be partly attributed to an increase in the number of households, but is also a reflection of growing incomes.

**Table 15.1** ISus Model Sectors and NACE classifications

Sector	NACE Classification
Agriculture, fishing, forestry	1, 2, 5
Coal, peat, petroleum, metal ores, quarrying	10–14
Food, beverage, tobacco	15–16
Textiles, clothing, leather & footwear	17–19
Wood & wood products	20
Pulp, paper & print production	21–22
Chemical production	24
Rubber & plastic production	25
Non-metallic mineral production	26
Metal production excluding machinery & transport equipment	27–28
Agriculture & industrial machinery	29
Office and data process machines	30
Electrical goods	31–33
Transport equipment	34–35
Other manufacturing	36–37, 23
Fuel, power, water	40–41
Construction	45
Services (excluding transport)	50–55, 64–95
Transport	60–63
Residential	

**Figure 15.1 Waste Projections: Business-as-Usual Scenario (Source: ISus)**

Approximately two-thirds of municipal solid waste (MSW) is composed of biodegradable municipal waste (BMW); it is projected that BMW will increase by approximately 4 per cent per annum over the next decade and will have doubled by 2025 compared to 2006. This strong potential for growth in waste generation underscores the importance of waste prevention programmes, such as the National Waste Prevention Programme (see Chapter 10).

Forecasting investment profiles for waste infrastructure is very uncertain, but is useful as an exercise to assess future infrastructure capacity requirements. The analysis presented assumes that some of the already licensed municipal waste thermal treatment plants will become operational during the forecast period beginning in 2010. Regardless of the deployment of thermal treatment for municipal waste, the projection outlined in Table 15.2 and Figure 15.2 underscores the country's high reliance on landfill. The anticipated sharp downturn in both MSW and BMW landfilled in 2010–2013 matches the assumed deployment of municipal waste incineration (see Figure 15.2). Landfill of municipal waste is

projected to increase to 3.1 Mt by 2025 (excluding incinerator ash) – a 60 per cent increase on 2006. The projections suggest that the growth in municipal waste (including incinerator ash) will require an additional 1.25 Mt of landfill capacity per annum by 2025.

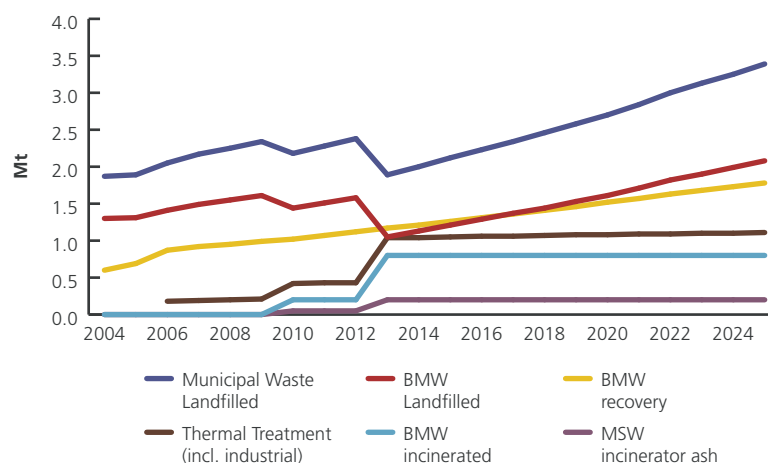
The maximum quantity of BMW allowed to be landfilled under the Landfill Directive (1999/31/EC) is 0.97 Mt by 2010, 0.64 Mt by 2013 and 0.45 Mt in 2016 and beyond. The assumed deployment of municipal waste incineration capacity is expected to divert 0.8 Mt of BMW waste from landfill, and a projected

4 per cent per annum growth in recovery of BMW will divert an additional 0.8 Mt compared to 2006. However, even with that level of additional diversion of BMW from landfill a significant shortfall from the Landfill Directive targets will remain, ranging from roughly 0.5 Mt in 2010 to 0.8 Mt in 2016 to 1.6 Mt in 2025, as illustrated in Figure 15.3. Meeting the Landfill Directive targets will be a particularly arduous challenge for the country, and radical change in management practices will be necessary if compliance with the directive is to be achieved.

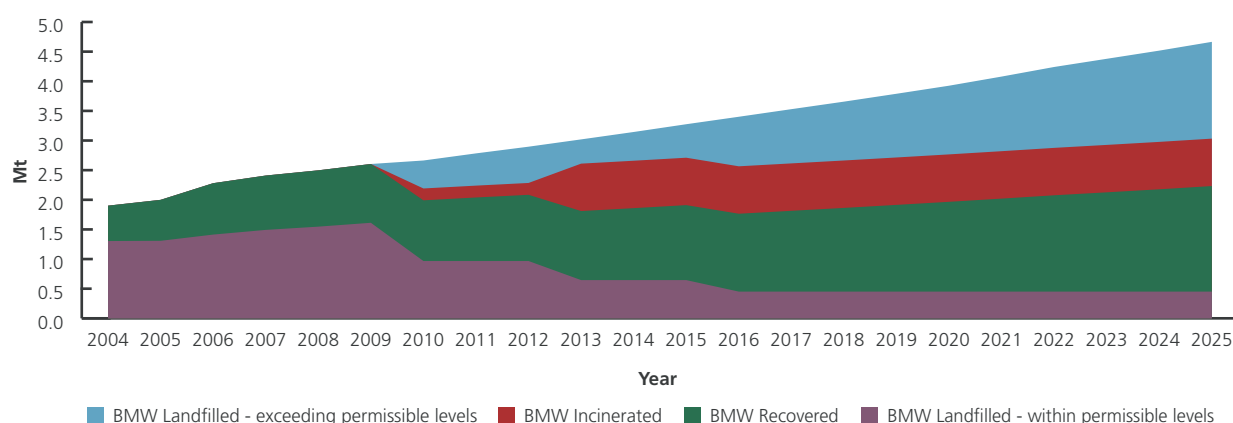
### Waste – Sector Analysis

Environmental performance in individual business sectors varies considerably from the forecast trends for the entire country. In several sectors no significant change is anticipated over the scenario period, but in others large changes in waste generation are forecast. Sector level waste projections are presented in Table 15.3 and discussed below.

Waste generation in the chemicals sector is projected to grow quite strongly, matching growth in economic output of approximately

**Figure 15.2 Waste Infrastructure Projections: Business-as-Usual Scenario (Source: ISus)**

**Figure 15.3 Biodegradable Municipal Waste Management Projections: Business-as-Usual Scenario**  
(Source: ISus)



3–4 per cent per annum over the scenario period (see FitzGerald *et al.*, 2008). As illustrated below, the chemicals sector has relatively good performance compared to other sectors with respect to minimising non-hazardous waste generation but is among the highest generators of hazardous waste.

The construction sector generated 16.8 Mt of waste in 2006, equivalent to 55 per cent of total waste generated (Le Bolloch *et al.*, 2007). Most of that waste is soil and stone, for which there is a high level of recovery (88 per cent in 2006). However, the balance, which amounted to almost 3 Mt in 2006, or 10 per cent of total waste generated,

has a much lower rate of recovery (36 per cent in 2006). Efforts to improve waste prevention in the sector will benefit from the current slowdown, particularly in the residential construction sector. In the medium term continued construction investment, especially under the National Development

**Table 15.2 Waste Projections: Business-as-Usual Scenario (Source: ISus)**

	2004	2005	2006	2007–2010	2011–2015	2016–2020	2021–2025	2007–2010	2011–2015	2016–2020	2021–2025
	Mt per annum							Average annual % change			
<i>Waste generation</i>											
Municipal waste	3.13	3.07	3.56	3.97	4.71	5.70	6.82	3.9	4.2	3.7	3.6
BMW	1.90	2.00	2.28	2.54	3.02	3.66	4.38	4.0	4.2	3.7	3.5
Hazardous waste	0.63	n.a.	0.79	0.76	0.82	0.87	0.92	–0.4	1.4	1.6	0.5
Construction waste	11.17	14.93	16.82	14.14	14.46	14.20	14.19	–4.5	0.3	0.5	–0.9
All waste (excluding agricultural)	24.77	n.a.	30.83	29.17	31.28	33.26	35.66	5.9	3.2	3.1	1.7
Municipal waste/person (t)	0.77	0.74	0.84	0.90	1.01	1.15	1.31	2.4	3.0	2.5	2.6
<i>Waste management</i>											
Municipal waste landfilled	1.87	1.89	2.05	2.23	2.13	2.46	3.12	1.5	–0.6	5.0	4.7
BMW landfilled	1.30	1.31	1.41	1.52	1.30	1.45	1.90	0.5	–3.4	5.9	5.3
BMW recovery	0.60	0.69	0.87	0.97	1.17	1.41	1.68	4.2	4.3	3.7	3.3
BMW incinerated	0.00	0.00	0.00	0.05	0.56	0.80	0.80	n.a.	32.0	0.0	0.0
MSW incinerator ash	0.00	0.00	0.00	0.01	0.14	0.20	0.20	n.a.	32.0	0.0	0.0
Thermal treatment (including industrial)	0.27	n.a.	0.18	0.26	0.80	1.07	1.10	22.8	20.1	0.6	0.5

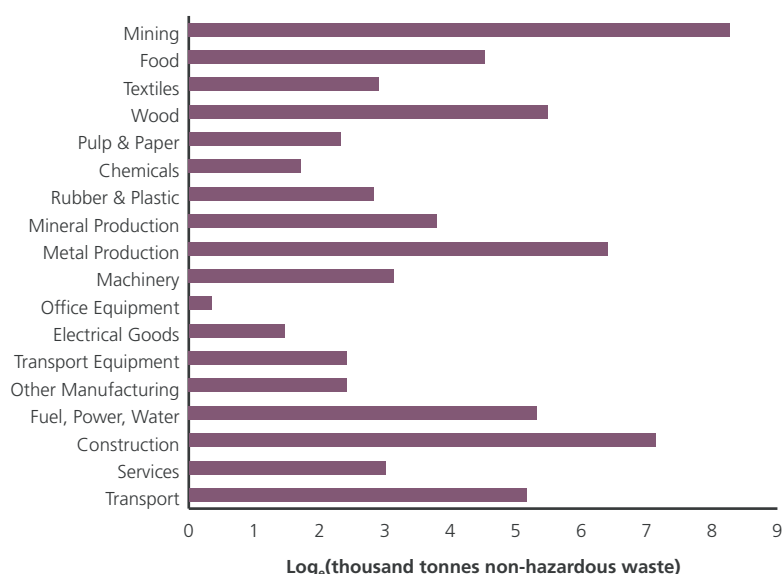


**Table 15.3 Non-hazardous Waste Generation by Sector: Business-as-Usual Scenario (Source: ISus)**

Sector	2006	2007–2010	2011–2015	2016–2020	2021–2025	2007–2010	2011–2015	2016–2020	2021–2025
	Mt per annum					Average annual % change			
Agriculture (including slurries)	59.38	57.62	57.77	57.06	55.89	–0.40	–0.30	–0.33	–0.42
Mining	4.78	4.94	5.32	5.88	6.49	1.18	2.00	2.00	2.00
Food	1.74	1.89	2.07	2.28	2.52	2.87	2.00	2.00	2.00
Textiles	0.01	0.01	0.01	0.01	0.01	1.18	2.00	2.00	2.00
Wood	0.25	0.25	0.27	0.30	0.33	1.18	2.00	2.00	2.00
Pulp & paper	0.15	0.15	0.16	0.18	0.20	1.18	2.00	2.00	2.00
Chemicals	0.18	0.20	0.24	0.28	0.32	5.88	3.18	3.08	1.66
Rubber & plastic	0.02	0.02	0.03	0.03	0.03	1.18	2.00	2.00	2.00
Mineral production	0.08	0.08	0.08	0.08	0.09	–2.76	0.76	1.92	1.01
Metal production	1.24	1.44	1.73	2.00	2.24	5.88	3.18	3.08	1.66
Machinery	0.04	0.05	0.06	0.06	0.07	5.88	3.18	3.08	1.66
Office equipment	0.02	0.03	0.03	0.04	0.04	5.88	3.18	3.08	1.66
Electrical goods	0.05	0.06	0.07	0.09	0.10	5.88	3.18	3.08	1.66
Transport equipment	0.01	0.01	0.02	0.02	0.02	5.88	3.18	3.08	1.66
Other manufacturing	0.02	0.03	0.03	0.03	0.03	1.18	2.00	2.00	2.00
Fuel, power, water	0.33	0.41	0.45	0.48	0.51	6.91	1.30	1.31	1.04
Construction	16.82	14.14	14.46	14.20	14.19	–4.50	0.29	0.49	–0.91
Services	1.53	1.72	2.09	2.53	2.97	4.58	4.43	3.68	3.01
Transport	0.74	0.74	0.74	0.74	0.74	0.00	0.00	0.00	0.00
Residential	2.03	2.25	2.62	3.16	3.85	3.41	4.02	3.71	3.99
Total	89.44	86.05	88.24	89.47	90.65	–0.63	0.32	0.37	0.12

Plan (NDP), will mean that waste generation will remain at a high level – in excess of 14 Mt, or 50 per cent of total waste generation.

Following several years of strong output growth in the services sector, output is forecast to continue at a more moderate pace in the medium term, at almost 4 per cent per annum on average (FitzGerald *et al.*, 2008). Waste generation closely matches economic growth forecasts, with non-hazardous waste generation projected to reach 3 million tonnes by 2025, which is almost double latest data for 2006.

**Figure 15.4 Non-hazardous Waste Generation per Unit Value Gross Output, 2006 (Source: ISus)**



Significant demographic changes are anticipated over the next decade, with the population forecast to increase by 1 per cent per annum and the numbers of households to increase by 2 per cent per annum (FitzGerald *et al.*, 2008). Both population growth and household numbers will have a direct effect on the potential for waste generation for the residential sector, with annual average growth rates in the range of 3.4–4.0 per cent projected. By 2025 total non-hazardous waste generation from the residential sector is expected to be 90 per cent higher than in 2006.

Output in the manufacturing sector is forecast to increase by roughly 2–3 per cent per annum (FitzGerald *et al.*, 2008). Within the more traditional manufacturing sub-sectors such as textiles, pulp and paper, and the food and beverage sectors, waste generation is anticipated to grow by roughly 2 per cent per annum. In some of the more ‘high-tech’ sectors, such as electrical goods, office equipment and machinery production, the growth in waste generation is anticipated to be higher, at almost 6 per cent per annum on average to the end of this

decade, falling back to an average of approximately 3 per cent per annum over the next decade.

Each sector’s environmental performance can also be assessed with regard to waste per unit value of output produced. Companies invariably generate waste in the course of their activity, but analysing waste per unit value of output shows the relative environmental performance of business sectors. Such information is important if industrial or foreign direct investment policies are to be assessed for their impact on environmental targets or infrastructure. Figure 15.4 presents sector-level waste per unit output (agriculture excluded) and highlights that some sectors have a disproportionately poor performance in this regard. The six sectors with the poorest performance are mining, construction, metal production, wood and wood products, power generation and transport.

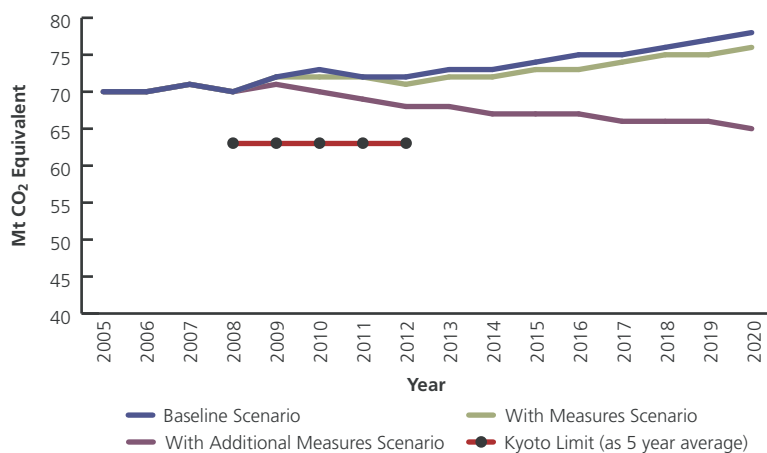
The mining and quarrying sector (NACE 10–14) has the poorest performance, with in excess of 3,500 t of waste per million euro gross output. Other sectors with high

volumes of waste generation per unit value of output are the construction sector (NACE 45) and metals production (NACE 27–28). The chemical (NACE 24), electrical goods (NACE 31–33) and office equipment (NACE 30) sectors are among the best performers with respect to non-hazardous waste production, each with less than 10 t non-hazardous waste per million euro gross output. However, these three sectors are the largest source of hazardous waste, with the chemical sector producing over 5 t per million euro gross output.

## Air Emissions

Ireland’s target in relation to the Kyoto Protocol is to limit total greenhouse gas (GHG) emissions to 314.2 Mt of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) over the five-year period 2008–2012, which is equivalent to 62.8 Mt of CO<sub>2</sub>e per annum over the period. National GHG emission projections, prepared by the EPA, are given in more detail in Chapter 3. These projections incorporate a number of emissions reduction scenarios: a ‘baseline’ scenario, a ‘with measures’ scenario and a ‘with additional measures’ scenario. The ‘baseline’ scenario largely incorporates policies and measures that were agreed and legislatively provided for up to the end of 2006. The ‘with measures’ scenario also includes all existing agreed policies and measures; for example, the National Climate Change Strategy (DEHLG, 2007). The ‘with additional measures’ scenario includes policies and measures that are under discussion and have a realistic chance of being adopted. The scenario projections are predicated on the assumption that all the relevant policies and measures will be adopted and fully implemented on time and that all relevant measures will achieve the



**Figure 15.5 National Greenhouse Gas Projections (Source: EPA)**

full emissions reductions anticipated. However, as can be seen from Figure 15.5, under each scenario examined it is not anticipated that actual emissions will decline sufficiently to reach our Kyoto target. The EU's proposed 20 per cent reduction target by 2020 compared to 2005 will be a major challenge for the country, especially given Ireland's large agricultural base and increasing transport emissions. This will become even more onerous if an international agreement on climate change is reached, when the EU will require an overall 30 per cent reduction. In future outputs from the ISus model will provide support to the ongoing work of GHG projections.

The EU National Emissions Ceilings (NEC) Directive sets targets, to be achieved by 2010, on a number of transboundary air emissions including sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), ammonia (NH<sub>3</sub>), and non-methane volatile organic compounds (NMVOCs). With the exception of NH<sub>3</sub>, current emissions exceed the 2010 target levels, as shown in Figure 15.6. NMVOC emissions are forecast to reach the target within the prescribed period, while SO<sub>2</sub>

emissions will only reach the target by the middle of the next decade. NO<sub>x</sub> emissions are forecast to decline slightly but remain considerably above the mandatory limit.

### Air Emissions – Sector Analysis

Emissions from agriculture, energy and transport are projected to account for over three-quarters of total GHG emissions in 2020 (see Chapter 3 for further details). Under the most benign projection scenario, GHG emissions will exceed Ireland's 20 per cent reduction target for 2020 compared to 2005 by 7 Mt (i.e. a reduction of 5% as compared to the 20% target). The other projection scenarios show GHG emissions actually increasing compared to 2005 emission levels (see Figure 15.5). The European Commission's 2020 GHG emission target for Ireland, similar to the Kyoto Protocol target, is a formidable challenge for the country. With roughly three-quarters of emissions arising from agriculture, energy and transport, efforts to improve emissions performance will need to concentrate on these areas.

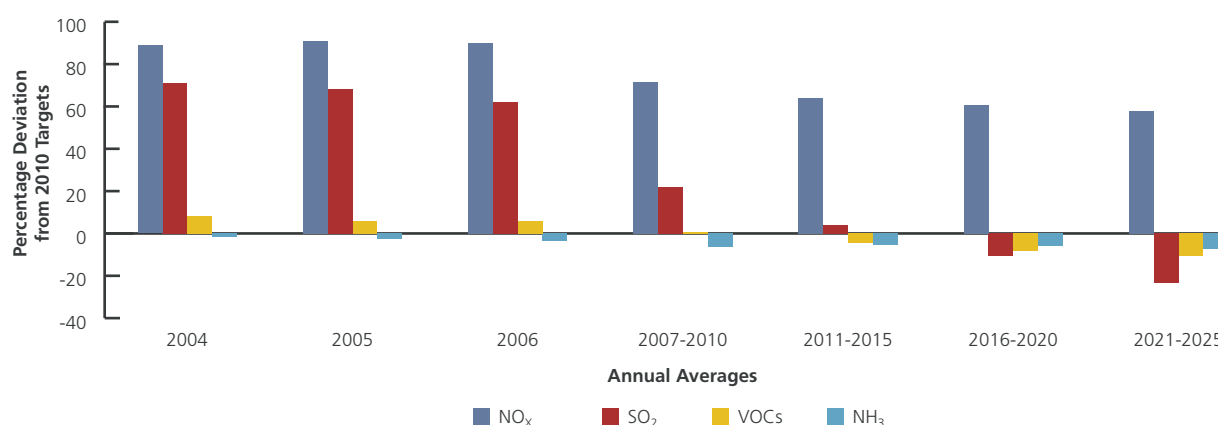
Emissions of gases regulated by the National Emissions Ceilings (NEC) Directive (e.g. SO<sub>2</sub>, NO<sub>x</sub>, NH<sub>3</sub>) are specific to a small number of sectors. The predominant sources of NO<sub>x</sub> emissions are the power generation and transport sectors, and the performance of both these sectors with respect to NO<sub>x</sub> emissions is projected to improve. However, increased NO<sub>x</sub> emissions from the mineral and metals productions sectors (NACE 26–28) are forecast to offset the gains. Ammonia emissions are predominantly from the agriculture sector but, as shown in Figure 15.6, emissions are already within target levels. Electricity generation has traditionally been the main source of SO<sub>2</sub> emissions. The dramatic reduction in emissions currently under way is largely due to the installation of technology to remove SO<sub>2</sub> from emissions at Moneypoint generating station.

### Scenarios

In addition to producing air emission and waste projections, the ISus model can be used to investigate the effectiveness of environmental policy instruments. A preliminary scenario example, of how the landfill levy could assist in achieving the biodegradable municipal waste targets specified under the Landfill Directive is presented below.

### Biodegradable Municipal Waste (BMW)

The maximum quantity of BMW allowed to be landfilled under the Landfill Directive (1999/31/EC) is 0.97 Mt by 2010, 0.64 Mt by 2013 and 0.45 Mt in 2016 and beyond. The latest data available are for 2006, when 2.3 Mt of BMW was landfilled, and unless there is significant additional intervention to reverse

**Figure 15.6** Transboundary Air Emissions: Deviation from 2010 Targets (Source: ISus)


recent trends it is very unlikely that Ireland will comply with the initial 2010 target. The EPA has highlighted a number of potential policy options (Curtis, 2008) for consideration in the context of the National Biodegradable Waste Strategy, one of which is to increase the current landfill levy as an incentive to divert BMW to alternative treatment. The Irish waste management sector itself has also called for a substantial increase in the levy (e.g. Eunomia, 2008). At €20/t, the landfill levy is significantly lower than similar levies elsewhere in Europe.

The landfill levy scenario analysis presented here presumes that additional legislation could be enacted to increase the maximum permissible levy, and a range of levy scenarios up to €75/t are examined. It is also likely that increases in the landfill levy will be phased in over a number of years to allow customers and waste contractors to adjust behaviours and develop new infrastructure. For the purposes of the scenarios a baseline increase in the levy to €30 is assumed for 2009, with additional increases in subsequent years, as outlined in Table 15.4. A higher landfill levy might be

introduced on a phased basis, for example reaching €50/t in 2011 and remaining constant thereafter.

An increase in the landfill levy affects both waste generation and waste management practices. Some of the increase in the landfill levy will be passed through to households in the price they pay for waste collection, which will encourage a reduction in waste set out for collection. From the perspective of the waste management sector the increase in the landfill levy will make recovery technologies more competitive compared to landfill, thus encouraging a switch from landfill disposal to other treatment approaches, e.g. composting the organic fraction. However, there is a lack of data on the responsiveness of post-collection treatment to landfill prices, so this dimension is

not quantified in the analysis, which instead focuses on the household sector response.

Figure 15.7 shows the projected impact of increases in the landfill levy from the perspective of residential and commercial entities generating BMW waste. Regardless of the scale of the levy increase (i.e. €40–€75), it takes a number of years for the impact to become appreciable given the phased increase in the levy; as one would expect, higher levy increases result in a greater impact on waste generation and disposal. However, even with a substantial increase in the levy to €75/t, the impact in terms of BMW sent to landfill is disappointingly low. For instance, approximately 15,000 t less BMW is landfilled in 2015, reaching some 27,000 t by 2025, when a €75/t levy is phased in between 2009 and 2013. An explanation

**Table 15.4** Landfill Levy Scenarios

€/t	2009	2010	2011	2012	2013	2014–
Baseline – €30 levy	30	30	30	30	30	30
€40 levy	30	40	40	40	40	40
€50 levy	30	40	50	50	50	50
€60 levy	30	40	50	60	60	60
€75 levy	30	40	50	60	75	75

for this poor response to a very significant increase in the landfill levy relates to how waste collection is priced.

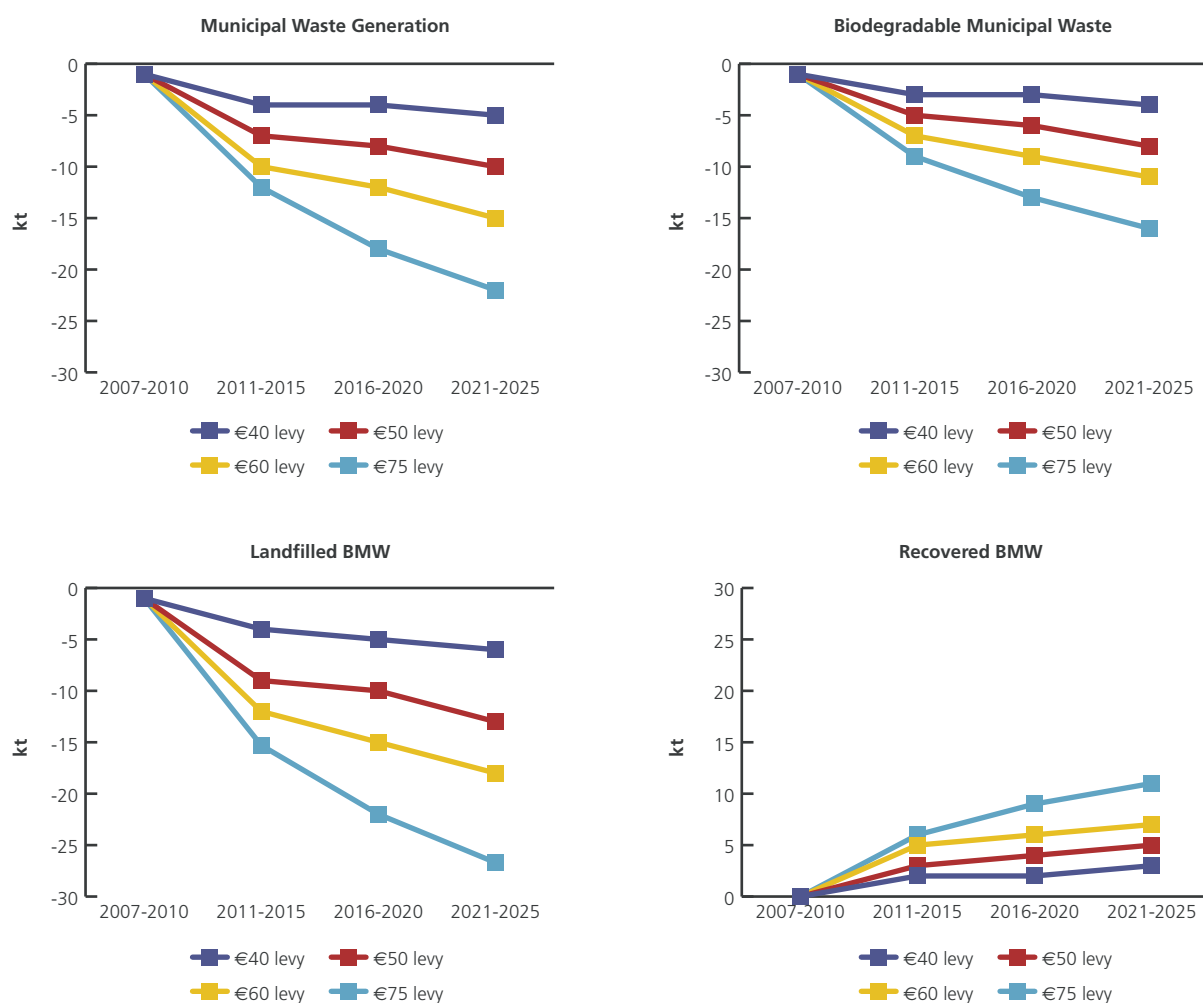
At present there are a range of pricing structures facing households – for example, pay-by-weight, pay-by-tag, pay-by-lift, pay by a flat annual fee conditional on bin volume, as well as a range of hybrid options. There is no accurate information on the proportion of households falling into each category, but available data suggest that a minority of households face a true pay-by-use system. In such a system the fee paid each period is in direct proportion to the amount of waste set out for

collection in that period. Pay-by-weight, pay-by-lift and pay-by-tag are true pay-by-use systems, whereas an annual fee on a particular sized bin is not. If households do not pay for waste collection via a true pay-by-use scheme, increases in the landfill levy will have an impact analogous to a TV licence price increase. It is something that people dislike having to pay, but has no impact on the amount of TV watched. If pay-by-use schemes were implemented to a significantly greater extent, increases in the landfill levy would have a greater impact on the generation of waste, as the increased levy would provide a greater and ongoing incentive to households to reduce

waste. This effect was observed in west Cork when a weight-based charging scheme was introduced (see Scott and Watson, 2006).

Figure 15.8 shows the €75 landfill levy scenario, as above, but with the increased use of pay-by-use schemes; increasing to 75 per cent and 100 per cent of households. The amount of waste generated, especially BMW, declines considerably due to implementation of pay-by-use. Households are effectively responding to the cost of disposal and reducing the amount of BMW that is sent for landfill disposal, and in parallel increasing the amount of recovery (e.g. by composting) of BMW waste.

Figure 15.7 Landfill Levy Increase Scenario (Source: ISus)



For instance, with 75 per cent of households facing a true pay-by-use pricing structure (compared to an assumed baseline level of 50 per cent) an additional 125,000 t of BMW would be diverted from landfill by 2025. An estimated 220,000 t would be diverted from landfill if all households were charged a true pay-by-use price.

## Summary

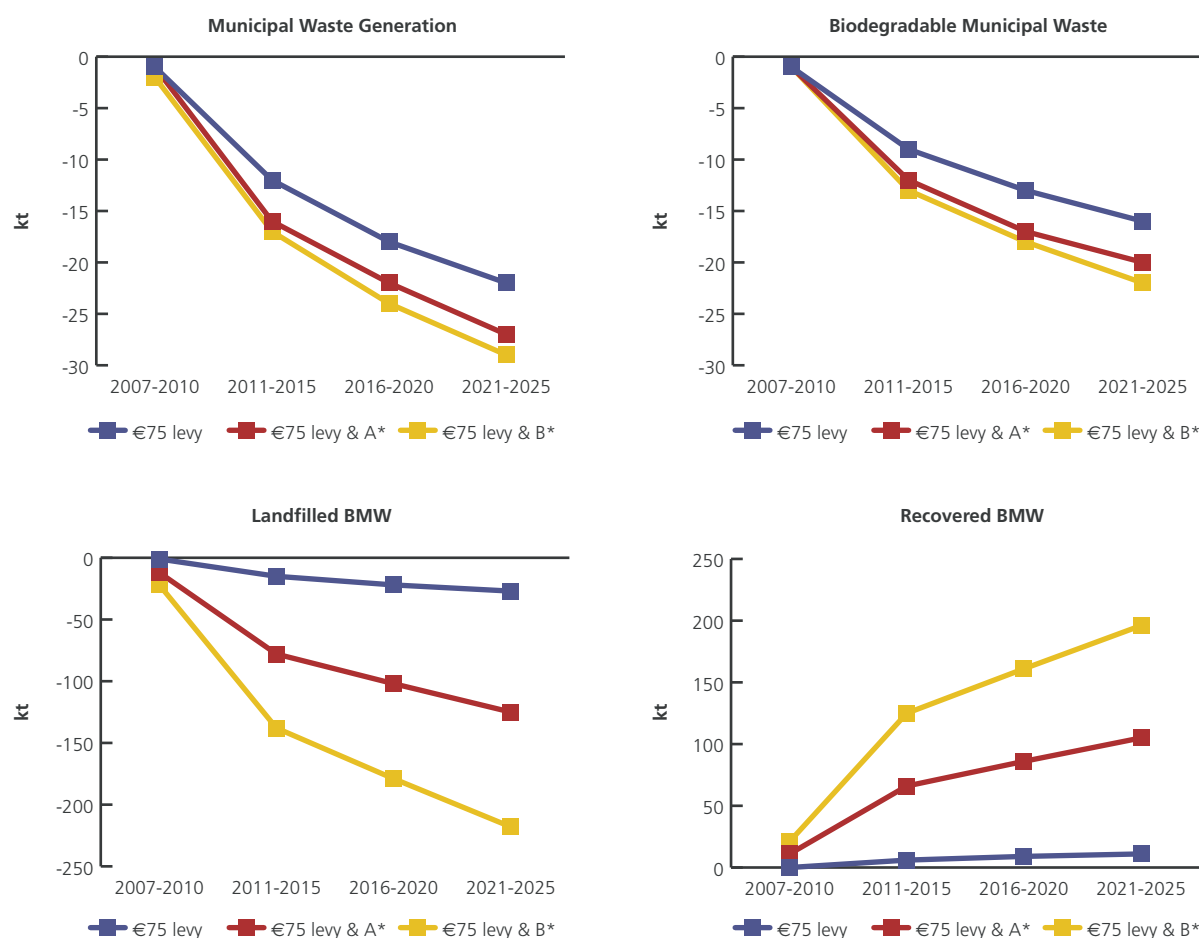
Contemplating how economic growth is likely to evolve and its possible impact on the environment enables potential problems to be

identified and solutions devised to avert environmental degradation. This chapter presents an analysis of what the future might look like for the environment, particularly for waste generation, and also examines the effectiveness of possible waste policy instruments.

The management of biodegradable municipal waste is recognised as one of the most pressing environmental problems currently facing the country. The projections presented in this chapter for waste generation and infrastructure requirements bring into greater focus the magnitude of the challenges ahead. In the case

of BMW waste management, the current focus is geared to achieving the 2010 target, but the analysis presented shows that the subsequent Landfill Directive targets for 2013 and 2016 will be even more challenging. One of the potential policy options available to government to increase diversion of BMW from landfill is to increase the landfill levy. Such a measure is likely to be welcomed by the waste management sector, as it will provide an economic incentive to develop non-landfill alternatives for BMW treatment. However, an increase in the landfill levy is unlikely to affect significantly the behaviour of households and businesses

**Figure 15.8** Landfill Levy and Pay-by-Use Scenario (Source: ISus)



\*A = increase to 75 per cent of households on 'true' pay-by-use collection  
 \*B = increase to 100 per cent of households on 'true' pay-by-use collection

generating the BMW unless they face true pay-by-use pricing for waste management services. Landfill levy increases will not affect their daily waste management decisions unless pay-by-use pricing is fully implemented.

At current levels of waste generation the country is facing a significant challenge to provide sufficient waste management infrastructure that will provide the means to comply with national and European waste management targets, in particular for BMW. However, with the exception of construction waste, all waste streams are projected to grow significantly over the next two decades, which further amplifies the waste infrastructure challenge. Municipal waste, for example, is projected to grow by as much as 4 per cent per annum, with total municipal waste generated projected to almost double 2006 levels by 2025. Even with greater rates of recovery projected and with 0.8 Mt of already licensed municipal waste treatment plant becoming operational, an additional 1.25 Mt of treatment capacity per annum would be required before 2025 to manage municipal waste safely.

Ireland faces a significant challenge to meet its GHG emissions targets both under the Kyoto Protocol in the period 2008–2012 and under the EU burden-sharing target for 2020 and beyond. Under the GHG emissions reduction scenarios outlined, and described in more detail in Chapter 3, it is not anticipated that actual emissions will decline sufficiently to reach the Kyoto target. The prospects for compliance with targets under the EU National Emissions Ceilings (NEC) Directive are more positive. With the exception of NO<sub>x</sub> emissions, emissions of acidifying gases are



expected to achieve prescribed target emission levels within the next few years. NO<sub>x</sub> emissions are too expected to decline but are likely to remain considerably above the target limit.

## References

- Brundtland, G.H. (1987) *Our Common Future*, Report of the World Commission on Environment and Development. Published as Annex to General Assembly document A/42/427. WCED, New York.
- Curtis, J. (2008) *Hitting the Targets for Biodegradable Municipal Waste: Ten Options For Change – Discussion Paper*. Environmental Protection Agency, Wexford.
- Department of Environment, Heritage and Local Government (2007) *National Climate Change Strategy 2007–2012*. DEHLG, Dublin.
- Eunomia (2008) *Meeting Ireland's Waste Targets: The Role of MBT*. Final Report for Greenstar by Eunomia Research and Consulting Ltd in association with Tobin Consulting Engineers.
- FitzGerald, J. et al. (2008) *Medium-Term Review 2008–2015*. Economic and Social Research Institute, Dublin.
- Le Bolloch, O., Cope, J., Meaney, B. and Kurz, I. (2007) *National Waste Report 2006*. Environmental Protection Agency, Wexford.
- O'Doherty, J., Mayor, K. and Tol, R. (2007) *Irish Sustainable Development Model (ISus): Literature Review, Data Availability and Model Design*. ESRI Working Paper 186. Economic and Social Research Institute, Dublin.
- Scott, S. and Watson, D. (2006) *Introduction of Weight-Based Charges for Domestic Solid Waste Disposal (2000-DS-6-M1)*. Final Report prepared for the Environmental Protection Agency, Wexford.