



**Submission to Green Paper:
Towards a Sustainable Energy Future for Ireland**



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Executive Summary

This submission was written in response to the open public consultation on the Department of Communications, Marine and Natural Resources (DCMNR) Green Paper: *Towards a Sustainable Energy Future for Ireland*. Indaver Ireland welcomes this paper and the opportunity to provide input as part of a consultation process prior to the release of the Energy White Paper.

The submission introduces the activities carried out and proposed by Indaver Ireland in the energy sector, and the contribution that waste products can make to the three pillars of Irish energy policy; security of supply, environmental sustainability and economic competitiveness.

Following on from this, a number of general themes are addressed, including the positive direction of the Green Paper in terms of targets and supports, and key issues relating to the use of waste materials in the energy sector. These include a need for:

- greater clarity and guidance on the position of Waste to Energy (WTE) facilities in Irish energy policy, particularly relating to the renewable component of energy produced
- greater cross sector coordination (as initiated by the Ministerial Task Force on Bioenergy) to facilitate, for example, the diversion of waste from landfill to energy recovery
- ongoing, long term financial supports for renewable energy
- recognition and support for district heating (DH) projects

Finally, specific questions as outlined in Section 3.2 of the Green Paper are addressed.

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Abbreviations

MSW : Municipal Solid Waste	BMW: Biodegradable MSW
WTE : Waste to Energy	SRF : Solvent Recovered Fuel
RDF : Refuse Derived Fuel	MBT: Mechanical Biological Treatment
CHP: Combined Heat and Power	DH: District Heating

1.0 Indaver's Activities

1.1 Indaver Ireland

Indaver NV is the Flemish parent company of Indaver Ireland. Indaver NV is a waste management company that specialises in recycling, treating and disposing (Figure 1.0) of both domestic and industrial waste. In particular, the company operates four WTE facilities with energy recovery, generating over 340 GWh electricity and 590 GWh steam/hot water in 2005. Most of this electricity was exported to the national grid, whilst the steam and hot water was exported to hospitals and local industry.

Advice on the prevention of waste is an integral part of the Indaver service. The company employs over 800 people and has operations in eight European countries. In 2005, Indaver managed approximately 1,180,000 tonnes of hazardous and non-hazardous waste at the company's waste recovery and disposal sites.



Figure 1.0 : Indaver NV Waste to Energy Facility in Belgium

Indaver was established in Ireland in 1999 and is involved in a number of waste management activities from waste prevention to waste treatment, as outlined in Table 1.0 below.

Table 1.0 : Some of Indaver Ireland's activities

On-Site Services	HazWaste Management
Total On-Site Waste Management	Waste Solvent Recovery
Paper Recycling	Management of Refuse Derived
Management of Recycling	Fuels (RDF)
Centres	

In addition to this, Indaver Ireland is currently developing two waste management projects in line with Irish waste policy; a non-hazardous incineration facility in County Meath, and an industrial waste facility, which includes a hazardous waste incinerator, in County Cork.

This broad range of activities and proposed developments enables Indaver Ireland to recover energy from both renewable waste, through bioenergy projects, and non-renewable waste, through solvent and other recovery projects. These activities generate energy products in the form of secondary fuels or useful electricity and heat. Many aspects of these projects are in line with the three pillars of the Green Paper, namely:

1. Enhancing security of energy supply (sourcing locally derived fuels)
2. Promoting the sustainability of energy supply (sourcing renewable fuels with additional benefits for Ireland's waste management system)
3. Enhancing the competition of energy supply (providing independent, flexible generation capacity)

Further details of the projects are given below.

1.2 Current Energy activities



Solvents Recovery in Dublin Port

Indaver Ireland currently operates a hazardous waste transfer station and solvents recovery facility in Dublin Port. The solvents recovery facility has the capacity to handle 20,000 tonnes per annum (tpa) of waste solvents from the pharmaceutical, chemical and other industries. The final product, referred to as Solvent Recovered Fuel (SRF), has suitable calorific properties for use as a liquid fuel in the cement or other heavy industries. While 2006 is the first year of operation of the facility, the total expected energy value of SRF from the Dublin Port facility is approximately 400 TJpa¹. This product is currently supplying a cement kiln in the island of Ireland.

Sludge Management

Indaver Ireland collects sludge from the pharmaceutical industry for treatment and onwards sale as a fuel to the power and cement industries. At present, the dried sludge product is exported for use in power plants in the EU. The energy value of these exports amounts to approximately 21 TJpa². Indaver Ireland is currently looking to expand this service, and anticipates that increased volumes may become available with the development of new wastewater treatment plants and the



¹ Average figures from analysis of samples and Indaver Ireland activities

² Figures derived from Indaver Ireland activities and IPPC Guidelines, *Emissions from Waste Incineration : Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, available at <http://www.ipcc-nggip.iges.or.jp/>

decline of landspreading, due to the Nitrates Directive. Indaver Ireland will continue to seek opportunities for energy recovery from this product in Ireland, however, there are a number of barriers preventing its greater uptake as a fuel (Section 4.2).



Refuse Derived Fuel (RDF)

Refuse Derived Fuel (RDF) is a pelletised or “fluffed” fuel that can be used in the cement and power industries, derived from bulk materials unsuitable for recycling such as carpets, mattresses, post consumer wood and residues from MSW Mechanical Biological Treatment (MBT) plants. As some of these materials include a biodegradable content, RDF can be considered partly renewable. Indaver

Ireland is currently involved in exporting RDF produced in Ireland to a cement plant in mainland Europe. The energy value of this fuel is estimated at 248 TJpa³.

With a view to increase uptake of this product and thereby divert more of this waste from landfill, Indaver Ireland is investigating opportunities for developing a RDF facility in Ireland. As for sludge, there are a number of barriers to the uptake of this product (Section 4.2). Current projections estimate the energy value of product to be handled by Indaver Ireland in the future at over 650 TJpa.

1.3 Planned Energy projects

Meath Waste to Energy (WTE) Facility

Plans are underway to construct a 200,000 tpa WTE facility for the treatment of residual municipal solid waste (MSW) generated primarily in the North East Region. This will generate approximately 16MW electricity of which 13MW will be available for export to the national grid. Up to 70% of residual MSW is biodegradable⁴, and therefore also considered as renewable. It is anticipated that this facility will commence operations in 2009.



Cork Waste Management Facility

Plans are underway to develop a Waste Management facility in Cork, which will be constructed in two phases. Phase I will include a 100,000 tpa industrial WTE plant, a waste transfer station and a community recycling park. Phase II will consist of a

100,000 tpa WTE plant for residual MSW generated primarily in the Cork Region. As for the Meath project, a fraction of the waste feed will be renewable.

³ Figures from Indaver Ireland activities and average SRF calorific values from internal report compiled by Juniper Consultants for Indaver Ireland on potential take-up of Alternative Fuels, August 2005

⁴ EPA Publication, *National Waste Database*, 2004, available at <http://www.epa.ie>

It is anticipated that with both phases in operation, the facility will produce the equivalent of 32MW thermal energy. This can be exploited in a combined heat and power (CHP) plant to generate electricity and steam/hot water, which could be distributed in a district heating (DH) system to local industry. The location of the Cork Waste Management Facility in the Ringaskiddy Peninsula provides distinct advantages for a DH project. A number of large scale industrial facilities are located within 1 – 2 km of the site, which have large and constant process heat requirements.

This large scale DH system would be unique in Ireland, providing a significant energy efficiency gain at the site as well as commercial and environmental benefits to customers. Indaver Ireland is currently undertaking a pre-feasibility study to determine the optimal use of energy from this facility.

Barriers to the development of both WTE projects are addressed in Section 4.2.

2.0 Contribution of Waste to Green Paper Pillars

2.1 Enhancing Security of Energy Supply

The EU Biomass Action Plan⁵ recognises that waste is an underutilised energy resource in Europe. Waste resources can contribute to the diversity of the national fuel mix and to the security of supply as an indigenous fuel; two key concerns addressed in the Green Paper. They can be used either in direct firing (e.g. in WTE facilities) or in co-firing (e.g. recovered solvents and RDF in cement/power plants).

At present, approximately 200,000 tpa pre-treated MSW, industrial and hazardous waste is exported for recovery in incineration and industrial facilities overseas⁶. In addition, approximately 1.8 million tonnes municipal solid waste (MSW) was landfilled in 2004² in Ireland of which over 90% is combustible material. Irish and EU waste policy requires that an increasing proportion of this be recovered for recycling (see Appendix A). However, residual waste remains an important potential energy resource. Further, with ambitious co-firing targets of 30% biomass in peat plants, full exploitation of all available sources of biomass will be necessary. With the appropriate waste infrastructure, energy from exported and landfilled waste materials could be recovered as an indigenous resource in Ireland.

As described in Section 1.0, Indaver Ireland is involved in current and future projects that recover energy from:

- Waste Solvents, at the existing Dublin Port Solvent Recovery facility

⁵ European Commission Publication, *Biomass Action Plan*, 2005, available at <http://ec.europa.eu/>

⁶ figures from EPA Publication, *National Waste Database*, 2004, available at <http://www.epa.ie>

The maximum potential supply of SRF in Ireland has been estimated at 121 ktpa, equivalent to approximately 4,720 TJpa⁷.

- Residual Municipal Solid Waste (MSW), of which a fraction is biodegradable (BMW), at the Meath and Cork Phase II WTE plants

The potential availability of energy from the BMW in WTE is conservatively estimated at 5,410 TJpa by 2010 and 5,930 TJpa by 2020.

This is discussed further in Section 2.2

- Bulk waste and waste unsuitable for recycling in a RDF facility

The maximum potential supply of RDF has been estimated at 800 ktpa⁸ or approximately 12,000 TJpa.

With these projects, Indaver Ireland will be operating both in upstream fuels (solid and liquid) production and in downstream electricity and steam generation.

2.2 Promoting the sustainability of energy supply

The biodegradable fraction of municipal waste (BMW) is recognised as a renewable energy resource in the EU Renewables Directive 2001/77/EEC, and in Irish energy policy.

The contribution of biomass resources to renewable energy production within the EU has been assessed in the European Environment Agency (EEA) report *How Much Bioenergy Can Europe Produce Without Harming the Environment?*⁹. This looks at how much biomass could technically be available for energy production in the EU to support EU renewable energy targets, without increasing pressures on the environment. The report found that in the short term, the largest potential for bioenergy came from the waste sector of which approximately one fifth was BMW, or roughly 15-20 MtOE for the EU-25. Thus BMW will play an important role in achieving European renewable energy targets.

In Ireland, bioenergy is recognised in the Green Paper as having significant potential for electricity and heat generation as a renewable, dispatchable resource. The recent initiative to establish a Ministerial Task Force to address a National Bioenergy Action Plan demonstrates the increasing importance of bioenergy in Irish energy policy.

Bioenergy derived from waste has significant potential in Ireland. The SEI publication *Bioenergy in Ireland*¹⁰ found the bioenergy potential from WTE, based on the BMW fraction, was 5.41 PJpa by 2010 and 5.93 PJpa by 2020. The 2010 figure

⁷ Internal report compiled by Juniper Consultants for Indaver Ireland on potential take-up of Alternative Fuels, August 2005

⁸ Internal report compiled by Juniper Consultants for Indaver Ireland on potential take-up of Alternative Fuels, August 2005

⁹ EEA Publication, 2006, available from http://reports.eea.europa.eu/eea_report_2006_7/en.

¹⁰ SEI Publication, 2004, available from <http://www.sei.ie>

conservatively includes the development of three proposed WTE facilities, processing a total of 900 ktpa. Only a limited increase in capacity by 2020 is anticipated, due to the increased recycling and biological treatment of the BMW stream.

This compares with energy generated from other BMW energy pathways including landfill gas and anaerobic digestion, which together are estimated to generate only 0.8 PJpa by 2010 and 1.0 PJpa by 2020. From this it can be deduced that WTE could recover over 87% of all of the available energy in BMW by 2010.

This is equivalent to over one quarter, or 26.2%, of the total anticipated bioenergy production by 2010 and to 18.1% by 2020.

Thus WTE has considerable potential for Ireland's bioenergy production in the future.

2.3 Enhancing the competition of energy supply

Indaver Ireland intends to sell electricity to the national grid from the two proposed WTE facilities, which will be completed after the Single Electricity Market (SEM) goes live in 2007. These facilities both have a potential capacity of over 10MW electricity. Therefore, to sell electricity generated from them, Indaver Ireland would be obliged to become a market participant. This will enhance competition by providing independent, distributed electricity generation to the market.

In summary, the activities of Indaver Ireland are projected to contribute a total of approximately 2,400 TJpa to the energy sector in the form of indigenous and, to some extent, renewable secondary fuels and electricity/heat end products.

3.0 Positive Aspects of the Green Paper

There are a number of encouraging goals and commitments outlined in the Green Paper, including:

- The commitment to an increased target of 15% electricity consumption from renewable sources by 2010, and 30% by 2020, and the ambition to set an all-island renewable target by mid 2007
- The target of establishing 350MW CHP capacity by 2010
- The target of co-firing up to 30% biomass at the existing peat plants
- The target of 5% of the heat market to be provided by renewable resources by 2010 of which 50% is to be sourced from biomass
- The setting up of a Ministerial Task Force on Bioenergy to coordinate action across all Departments, and to establish a National Bioenergy Action Plan
- The support under the REFIT scheme of 400MW renewable electricity capacity
- The support under the SEI grant scheme of CHP projects

These overall targets contribute towards long-term security for investors in the renewable energy sector. The enhanced coordination between sectors under the Ministerial Task Force will greatly facilitate the development of alternative energy projects by, for example, clarifying technical definitions and aligning waste and energy policies. Finally, the financial supports provide access to a challenging market and enable renewables to compete with traditional fuels.

4.0 Issues Arising

In addition to these positive aspects, Indaver Ireland would like to highlight a number of barriers faced by waste products in the energy sector.

4.1 Position on WTE

The enhanced coordination between sectors under the Ministerial Task Force is welcome. In particular, it is hoped that this will provide an opportunity to clarify the position of WTE in Irish energy policy and address cross-sector issues.

Until now, there has been a lack of clarity and consistency from State Agencies on the position of WTE for municipal solid waste (MSW) as a bioenergy conversion method. For example, whilst WTE for MSW was identified as having the potential to contribute significantly to the bioenergy sector in *Bioenergy in Ireland* (ref Section 2.2), it was not included as a principal bioenergy pathway/resource in the same document and is not discussed in the main body of the report. However, landfill gas is included as a principal bioenergy resource and discussed in the report in some detail.

Further, the recent EPA discussion paper *Bio-energy – opportunities for agriculture, industry, and waste management*¹¹, specifies opportunities from WTE as “incineration with energy recovery of individual waste streams, (e.g. waste wood products)” which omits MSW and other heterogeneous waste, but does also list landfill gas as a bioenergy resource.

Landfill is the lowest waste management option according to the internationally recognised waste management hierarchy (see Figure 2.0).

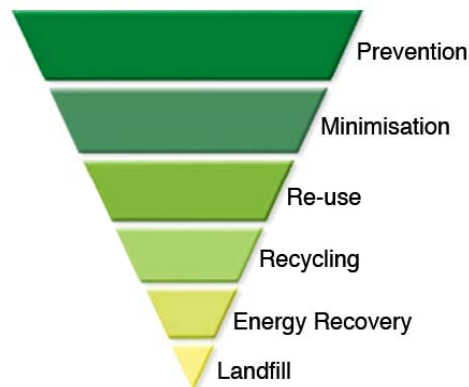


Figure 2.0: Internationally recognised Waste Hierarchy

EU and Irish waste policy have implemented ambitious landfill diversion targets to be met within the next four years¹². Including landfill and not WTE as a principal bioenergy pathway for BMW in Ireland is inconsistent with this policy.

National policy should consistently support waste management technologies that are higher in the waste hierarchy than landfill, to ensure that Ireland achieves national and EU landfill diversion targets (see Section 4.2).

This applies in particular to the support for energy produced from BMW in WTE in a renewable energy support scheme (currently REFIT). Whilst landfill gas is considered a bioenergy source eligible for renewable energy support in Ireland, it is unclear as to whether energy produced from BMW in WTE, a higher in hierarchy technology, would also be also eligible.

Defining both energy resources and pathways as in the SEI and EPA documents is unnecessarily restrictive and inhibits the emergence of new, alternative technologies and resources such as the conversion of solid biodegradable waste to liquid fuel. As seen above, this strategy has ignored the potential 25% contribution to bioenergy

¹¹ EPA Discussion Paper, *Bio-energy – opportunities for agriculture, industry, and waste management*, 2006, available at <http://www.epa.ie>

¹² Council Directive 1999/31/EC on the Landfill of Waste available at <http://ec.europa.eu/environment/waste/index.htm>, Irish policy document *Waste Management: Changing Our Ways* available from <http://www.environ.ie>

production from WTE, whilst promoting landfill, a technology actively discouraged at a national and EU level.

Indaver Ireland welcomes the definition of waste as a bioenergy provided in the Green Paper (page 73), which is in line with the EU Renewables Directive 2001/77/EEC, and is sufficiently broad as to avoid excluding any specific resource or conversion pathway. This definition should be applied across the different sectors, through the medium of the Ministerial Task Force.

Indaver Ireland requests that future policy addresses this inconsistency in the definition of WTE for MSW as a bioenergy resource, particularly with consideration of Irish and EU waste policy and the Waste Hierarchy.

4.2 Barriers in the Waste Sector

Whilst it is understood that the focus of the Green Paper is the energy sector, a key barrier to the uptake of waste as an indigenous and, to some extent, renewable fuel lies in the waste sector.

Excess landfill capacity has developed in Ireland despite Irish and EU waste policy requiring a reduction in reliance on landfill. Companies looking to develop waste infrastructure higher in the Waste Hierarchy (Figure 2.0) are concerned that this has led to a significant drop in landfill gate fees, which could reach as low as €30-50/tonne¹³. Such low charges would create an extremely unfavourable environment for investment in much needed alternative waste infrastructure. This is because waste infrastructure higher in the Waste Hierarchy operates to higher environmental standards, requiring higher capital expenditure and therefore increased gate fees of over €100/tonne. Where low landfill gate fees persist, recycling and energy recovery from waste including RDF and sludge will be unable to compete with landfill.

Ireland urgently needs to develop alternatives to landfill in order to attain an integrated waste management system in line with the Waste Hierarchy. The current alternative waste infrastructure deficit is referred to in the recent Forfas *Waste Benchmarking Study*¹⁴ as a key issue for international competitiveness and meeting targets set out in the EU Landfill Directive¹⁵. Without such infrastructure, this potential energy resource will continue to be diverted to landfill.

Indaver Ireland recently responded to a Department of Environment, Heritage and Local Government (DoEHLG) consultation paper on the regulation of the waste sector. In this, it was recommended that the landfill levy be increased to provide sufficient incentive for the development of alternative waste infrastructure and

¹³ Data presented at IWMA meeting in September 2006, compiled from White Young Green and IBEC surveys

¹⁴ Forfas Publication, 2006, available from <http://www.forfas.ie>

¹⁵ The EU Landfilling of Waste Directive (99/31/EC) outlines targets for member states for the diversion of biodegradable municipal waste (BMW) from landfill. Ireland received a derogation of four years on its first target, and must now achieve a 25% diversion rate of BMW (compared with BMW generation in 1995) by 2010, 50% by 2013 and 35% by 2016.

consequent diversion of waste away from landfill. Other initiatives that could direct waste away from landfill and towards energy recovery include:

- better coordination between State Agencies in the planning and licensing of waste infrastructure
- facilitating the trial of recovered waste fuels at power and cement plants, in conjunction with the EPA
- providing financial incentives such as REPAK¹⁶ subsidies for packaging waste recovered in RDF, for which targets are set out in the EU Directive 94/62/EC
- providing capital grants or financial incentives to enable heavy industry to switch to waste derived fuels and to CHP/DH schemes as addressed below
- providing financial incentives for electricity generated in the form of renewable energy supports (see Section 4.3)

It is submitted that the participation of the Department of Enterprise, Trade and Employment in the Ministerial Task Force could facilitate the funding of industrial applications for waste derived fuels.

The Ministerial Task Force on Bioenergy could coordinate these policy and financial drivers in its role as a cross-sectoral body for promoting bioenergy development. However, given that not all available waste is biomass (generating bioenergy), additional consideration and coordination is required between the DoEHLG and DCMNR to promote the wider use of waste as an energy resource.

4.3 Renewable Energy Support

The REFIT scheme was designed to provide support to 400MW renewable capacity. It is understood that this capacity has now been met, and that any additional applications will be included in a reserve list. Developers of renewable energy projects who have not yet submitted an application therefore face a high degree of uncertainty in terms of obtaining support.

Indaver Ireland recognises that the original purpose of the scheme was to meet Irish renewable energy targets of 15% electricity consumed by 2010 and 30% by 2020. It appears unreasonable to withdraw this support after attaining the initial, 2010 target. Renewable energy capacity must continue to grow to 30% of electricity consumption by 2020 in order to stay on target. Withdrawing support mechanisms could create an environment of investment uncertainty in renewable energy, slowing future growth and putting Ireland at a competitive disadvantage. This is echoed by the European Commission in a Memo *How to Support Renewable Electricity in Europe?*¹⁷

¹⁶ For more information, see website <http://www.repak.ie>

¹⁷ DG TREN, *Memo : How to Support Renewable Electricity in Europe? – An assessment of the different support schemes*, European Commission, 2005, available at http://ec.europa.eu/energy/index_en.html

requesting that Member States optimise and fine-tune renewable energy support schemes by:

Increasing legislative stability and reducing investment risk. *One of the main concerns with national support schemes is any stop-and-go nature of a system. Any instability in the system creates high investment risks, normally taking the form of higher costs for consumers. Thus, the system needs to be regarded as stable and reliable by market participants in the long run in order to reduce the perceived risk....the design of a support mechanism must minimise unnecessary market risk.*

As recognised in the Green Paper, renewable energy can contribute to the key goals of energy security of supply, sustainability of energy supply and greenhouse gas emissions reductions. Slowing renewable energy growth would restrict carbon gains. This would be very counterproductive, considering it is likely Ireland will miss Kyoto targets and therefore should be striving as much as possible to achieve reductions.

A study of support mechanisms for Ireland¹⁸ found that it costs less in the long term to support renewable energy at these early stages of development. An ongoing support mechanism would provide the required long-term investment security and would encourage the growth of bioenergy. Indaver Ireland is unaware of any Member State that does not currently have a renewable energy support mechanism for electricity in place.

Electricity sales are a critical component of business plans for facilities such as WTE plants, which must achieve a balance between landfill gate fees and electricity sales in order to be viable. As explained in Section 4.2, gate fees are currently under threat from excess landfill capacity. This will drive waste towards landfill and away from potential recovery or recycling opportunities, resulting in the loss of a potential energy resource. Without support for the sale of renewable electricity, Indaver Ireland has been advised that it will be extremely difficult for smaller generators to obtain a PPA for the sale of electricity. Further, it appears unlikely that trading directly to the market will be feasible for a small generator.

Indaver Ireland would urge DCMNR to continue financial support mechanisms for renewable heat and electricity generation.

4.4 District Heating

The Green Paper outlines supports in place for CHP projects in terms of removing barriers and providing a grant scheme. However, it does not address the topic of district heating (DH), which has the potential to provide important gains in the heat sector.

¹⁸ Huber, C. et al, *Economic modelling of price support mechanisms for renewable energy : Cast study on Ireland*, 2006, Elsevier, available at <http://www.elsevier.com>

DH can greatly increase the efficiency of energy generation and supply, coupled with a boiler or a CHP plant for heat generation. For example, whilst building specific heating using a gas boiler is typically associated with CO₂ emissions of 260g/kWh, heating the same building with a gas fired CHP district heating system would generate only 10 g CO₂/kWh. This represents a saving of over 96% CO₂ emissions¹⁹.

SEI's report *Assessment of the Barriers and Opportunities Facing the Deployment of District Heating in Ireland*²⁰ provided an important overview of the potential for CHP/DH in Ireland. This identifies a number of key barriers including Ireland's mild climate, low-density housing, gas and electricity price differences, high capital costs, and uncertainty regarding consumer uptake. Whilst the climate in Ireland may be too mild for certain applications, the SEI report found that CHP/DH would be "very attractive for regeneration or new-build development plans in densely populated areas". Important efficiency gains can also be made in business parks or with industrial users. It is worth noting that successful schemes have recently been implemented in Southampton and citywide across Leicester in the UK.

Indaver Ireland is currently investigating CHP/DH options to supply heat to local industry from the Cork WTE project. The year-round process heat demand from industry would enable the system to constantly operate at design capacity, thus making it highly efficient. As Indaver Ireland will be processing waste material from these local industries, it is likely that shut down and maintenance periods will also coincide. Furthermore, new developments planned for this area, including a residential/commercial centre on Haulbowline Island and biofuel production facilities, may provide additional demand security.

Whilst scoping for a pre-feasibility study for this project, Indaver Ireland visited Denmark and Sweden to inspect DH systems and the potential for DH in Ireland. Some basic findings are provided in Appendix B. Of particular note is the participation of municipalities in the establishment of DH systems. Given the current lack of DH infrastructure in Ireland, projects would involve considerable capital investment to develop distribution networks. However, these networks could eventually become part of the critical infrastructure of the country, as are road networks and power lines.

The SEI report found that the possible availability of capital grants could provide a useful incentive to attain the national economic DH potential, which is estimated at 50MWe. As such, it is submitted that CHP/DH projects should receive support, either in the form of directives favouring CHP/DH, planning and/or financial support to establish the required infrastructure.

It is critical to the development of DH that Irish energy policy recognises and supports it as an important element in developing the heat market.

¹⁹ Constantinescu, N., *Ecoheatcool Work Package 3 : Guidelines for assessing the efficiency of district heating and district cooling systems*, Euroheat & Power, 2005, available at <http://www.ecoheatcool.org>

²⁰ SEI Publication, *Assessment of the Barriers and Opportunities Facing the Deployment of District Heating in Ireland*, 2002, available from <http://www.sei.ie>

5.0 Specific questions to address

In Section 3.2 of the Green Paper, a number of specific questions have been posed. Indaver Ireland has provided responses to questions relevant to its operations in Ireland.

5.1 Q3.2.4 : Challenges to Greater Participation

Q 3.2.4 : What are the challenges to greater participation by new players in the development and operation of power generation plant – and how should they be addressed?

Indaver Ireland is currently proceeding with a connection application for its Meath WTE facility. The facility is to export 13MW electricity, and therefore has the option of connecting to either the distribution network or the transmission network.

Whilst Indaver Ireland has received a high quality level of service from ESB Networks during this period, it supports the IBEC Energy Policy Committee²¹ assertion that there is a “*need to streamline a smoother, speedier and more cost competitive transition from connection application to actual build*”.

Indaver Ireland understands that rules under the SEM are still being confirmed. However, more guidance for new players is required, on:

- Obtaining permits and operating licences
- Options for interaction with the market
- CER issued documents, particularly with regards to pricing mechanisms

This guidance could take the form of workshops for new players looking to connect to the system.

Further to this, a number of challenges specific to the development of a WTE facility have been raised in this submission, including:

- a lack of clarity on the position of WTE activities within Irish energy policy
- supply issues, where low landfill gate fees are diverting waste away from energy recovery
- a requirement for renewable energy support

These matters are elaborated on in responses to other questions below.

²¹ IBEC Energy Policy Committee, *7 Principles of a National Energy Policy*, IBEC, 2006, available at <http://www.ibec.ie/>

5.2 Questions 3.2.6, 3.2.9 & 3.2.14: Encouraging indigenous resources / diversity of Renewable Energy resources / Supply and Demand Issues for Bioenergy

This section will address the following three questions together, given that the barriers and issues facing the uptake of renewable and non-renewable waste resources are largely the same:

- Q 3.2.6 : What measures could be taken to encourage the exploration and production of indigenous energy resources?
- Q 3.2.9 : What can be done to improve the pace and range of development of renewable energy resources for electricity generation on a sustainable basis?
- Q3.2.14 : What are the key supply and demand questions to be addressed to underpin a fully cohesive National BioEnergy Strategy?

As discussed, waste is an underused energy resource. Whilst it is critical that waste is appropriately managed according to the Waste Hierarchy (see Figure 2.0 and Appendix A), there are a number of waste resources that are currently unsuitable for recycling. This includes both biodegradable waste and non-biodegradable waste products, as described in Section 1.0. Although making only a relatively small contribution to overall energy requirements, these fuels are flexible, indigenous, to some extent renewable and provide additional environmental benefits for the waste sector.

However, as described in Section 4.2 there are barriers to the uptake of these fuels in the waste sector. These mostly relate to excess landfill capacity lowering gate fees and thereby diverting waste to landfill. Energy recovery from waste is positioned higher in the waste hierarchy than landfill, and therefore should be prioritised in energy policy as well as waste policy for residual waste management.

Section 4.2 also explored initiatives that could be addressed by the interdepartmental Ministerial Task Force for Bioenergy and other State Bodies to redirect waste towards energy recovery. In particular, these included:

- increased alignment of waste and energy policy, through
 - the Ministerial Task Force. It is hoped that this will also provide an opportunity to clarify the position of WTE as a bioenergy resource in waste and energy policy, as outlined in Section 4.1. It will be important that this Task Force provides meaningful and transparent results.
 - further coordination and cooperation between DoEHLG and DCMNR with regards to non-renewable waste that can contribute to other energy and waste policy goals.
 - policy drivers such as increased landfill levies and streamlining of planning and licensing, with special consideration for trials that could be held in conjunction with the EPA

- financial support e.g. REPAK subsidies, renewable energy subsidies (where relevant), and capital grants or other subsidies for fuel switching.
 - As described in Section 4.3, a long-term financial support mechanism would provide investment security for the development of renewable heat and electricity generation. This could come in the form of an extension of the REFIT scheme, or other recognised support schemes such as green certificates, which may eventually be adopted as a pan-European support system for renewables²².

This would encourage the diversion of residual waste from landfill to energy recovery, where appropriate (See Appendix A), in line with EU waste policy.

Indaver Ireland strongly recommends the implementation of policy and/or financial support mechanisms that would encourage the uptake of waste in the energy sector.

5.3 Q3.2.10 : Developing the heat and transport sectors

Q 3.2.10 : In addition to electricity generation, what actions should be taken to develop renewable energy usage in the transport and heat sectors?

As described in Section 4.4, the Green Paper discusses supports for CHP but omits the subject of DH. This is an important component of the heat sector and should be addressed in Irish energy policy. DH requires special consideration and support due to the capital intensive nature of distribution networks. Once established, these networks could become part of the critical infrastructure of the country, as are roads and power lines.

Indaver Ireland is investigating the potential for a large scale DH system at its Cork WTE facility, to distribute heat to local industry. This would be highly efficient because the process heat demand of industry is consistent throughout the year. It is submitted that DH should receive recognition and support in the form of policy and/or financial mechanisms. Without this support, DH will not develop to its full potential in Ireland.

As a result, Ireland will miss a valuable opportunity to increase the efficiency of energy generation and distribution and promoting the sustainability of energy supply.

5.4 Q 3.2.16 : Direction of Green Paper

Q3.2.16 : Does the Green Paper generally set the right policy directions for energy sustainability

This submission welcomes the positive initiatives outlined in the Green Paper, and agrees in principle with the general direction of the paper. In particular, the ambitious targets and supports will help to contribute towards long-term security for renewable

²² Fitzgerald, J. et al, *Aspects of Irish Energy Policy*, Policy Research Series Number 57, ESRI, 2005

energy investors. Furthermore, the Ministerial Task Force provides an important forum for clarifying and aligning Irish waste and energy policy.

In addition to this, the submission outlines a number of important issues for consideration in Irish energy policy, including:

- Clarification of the position of WTE in Irish energy policy
- Addressing barriers in the waste sector to the uptake, where appropriate, of waste as a fuel, through the Ministerial Task Force and other State Bodies
- Requirement for financial support mechanisms, including an ongoing renewable electricity support mechanism
- Requirement for recognition and support of DH

6.0 Summary

6.1 Summary of Waste Resources and Options

This document has described the energy potential of a number of waste derived fuels, and outlined the main barriers and incentives to the greater uptake of these products. These points are summarised in Table 1 below.

One critical requirement for driving the greater uptake of waste derived fuels, described at length in this document, is the improved coordination between DCMNR, DoEHLG, the EPA and other relevant departments, on both policy and planning/licensing of waste facilities. This has been initiated through the Ministerial Task Force on Bioenergy, but must be broadened to include to all waste derived fuels as listed in Table 2.0.

Table 2.0: Summary of Barriers and Incentives to uptake of Waste Derived Fuels

Waste Resource	Potential in Ireland	Barriers	Possible Incentives
SRF	<i>Maximum potential supply</i> : 121 ktpa or 4,720 TJpa <i>Potential Indaver supply</i> : 400 TJpa	<ul style="list-style-type: none"> - Administrative & financial burden of fuel switching in Ireland - Emerging energy product: requires testing 	<ul style="list-style-type: none"> - EPA test programme for industry - Financial support for fuel switching (capital grants or subsidies)
Sludge	Not estimated in internal report by Juniper Consultants but increasing with growth of WWTP installations <i>Current Indaver exports</i> : 21 TJpa	<ul style="list-style-type: none"> - Administrative & financial burden of fuel switching in Ireland - Excess Landfill - Emerging energy product: requires testing 	<ul style="list-style-type: none"> - EPA test programme for industry - Financial support for fuel switching (capital grants or subsidies) - Policy drivers in waste sector for landfill diversion and higher landfill tax - Nitrates Directive - Increased number of wastewater treatment plants
RDF	<i>Maximum potential supply</i> : 800ktpa or 12,000 TJpa <i>Current Indaver exports</i> : 248 TJpa (est. future Indaver potential > 650 TJpa)	<ul style="list-style-type: none"> - Administrative & financial burden of fuel switching in Ireland - Excess Landfill - Emerging energy product: requires testing 	<ul style="list-style-type: none"> - EPA test programme for industry - Financial supports: <ul style="list-style-type: none"> • subsidies for recovery of packaging waste e.g. REPAK • fuel switching (capital grants or subsidies) - Policy drivers in waste sector for landfill diversion and higher landfill tax
MSW & Hazardous waste (WTE)	<i>Conservative estimate</i> of potential availability from biodegradable component of MSW: up to 5,930 TJpa (by 2020) <i>Indaver potential</i> : 350 TJpa electricity exports (Meath WTE plant), up to 900 TJpa steam/electricity exports (Cork WTE plant)	<ul style="list-style-type: none"> - Excess Landfill - Inconsistency in energy and waste policy - Unclear policy on BMW in WTE as a bioenergy - Lack of support for renewable energy produced - Capital cost of developing CHP/DH scheme 	<ul style="list-style-type: none"> - Policy drivers in waste sector for landfill diversion and higher landfill tax - Renewable energy support scheme - Policy and/or financial support for CHP/DH schemes - Greater clarity for small generators to facilitate entry to electricity market

6.2 Conclusions

Energy recovery from waste can contribute to the three pillars of Irish energy policy: security of supply, sustainability of supply and competitiveness of supply. At present it is an underutilised resource and faces a number of barriers to uptake in the energy sector. In particular, excess landfill is diverting waste towards low-end disposal options, despite EU and Irish waste policy requiring a reduced reliance on landfill. Further, the position of WTE in Irish energy policy is unclear.

The Green Paper provides important direction in this regard, by aiming for increased coordination of waste and energy policy through the Ministerial Task Force, and by setting ambitious targets for renewable energy and CHP. Indaver Ireland submits that these ambitions should be extended to include:

- specific measures for diverting waste from landfill to the energy sector
- ongoing and long term support for renewable electricity and heat
- financial and policy supports for fuel switching and DH.

This could see a much greater role develop for recovered waste products in the energy market in the future, in line with waste and energy policy, to create a more sustainable, secure and competitive energy supply in Ireland.

Appendix A : WTE and Recycling

Irish waste policy *Waste Management: Changing Our Ways* set out ambitious waste management targets to be achieved over a 15-year timescale (i.e. 2013-2014), which include:

- recycling of 35% of municipal waste;
- a diversion of 50% of overall household waste away from landfill;
- a minimum 65% reduction in biodegradable wastes consigned to landfill;
- the development of waste recovery facilities employing environmentally beneficial technologies, as an alternative to landfill; and
- rationalisation of municipal waste landfills.

In addition to this, Ireland must meet targets for biodegradable waste diversion from landfill set out in the EU Landfill Directive 99/31/EC. These are, for Ireland:

- 75% of the total amount (by weight) of BMW produced in 1995 by 2006;
- 50% of the total amount (by weight) of BMW produced in 1995 by 2009; and
- 35% of the total amount (by weight) of BMW produced in 1995 by 2016.

Whilst Ireland is performing well on household and packaging recycling, the *National Biodegradable Waste Strategy*²³ recognises that the waste sector will face a considerable challenge in order to meet EU biodegradable waste diversion targets. Further, the EPA *National Waste Database 2004*²⁴ found that there is still some distance to go to the 50% landfill diversion target.

This is largely due to Ireland's heavy reliance on landfill as a waste disposal option. *Changing Our Ways* highlights that “*Heavy reliance on landfill coupled in many cases with uneconomic charging policy has limited the development of integrated waste management approaches*” and has “*inhibited waste recovery and recycling options.*” Landfilling untreated waste is not sustainable in the long-term and is the lowest option on the waste hierarchy.

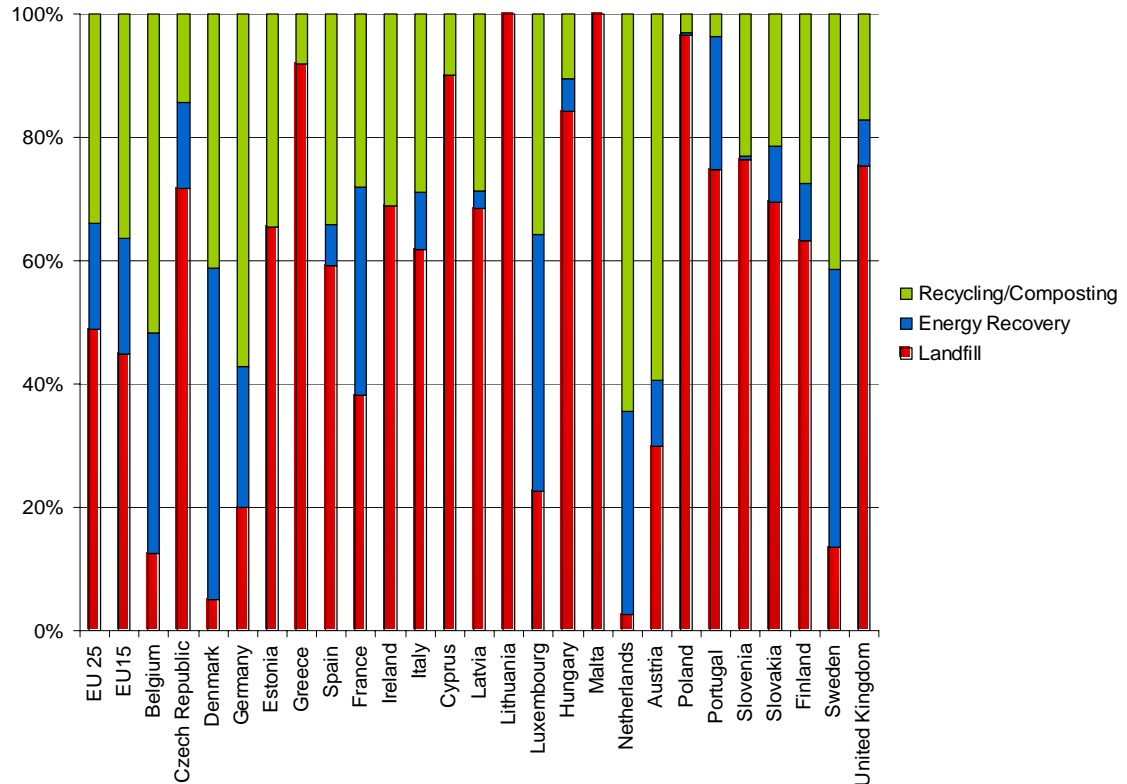
In order to progress towards landfill diversion targets, and achieve an integrated waste management system, Ireland requires waste infrastructure that is positioned higher in the waste hierarchy. It has been widely demonstrated that recycling and incineration with energy recovery are complementary options, which divert waste away from landfill.

For example, the Flanders region of Belgium, where Indaver was first established, has the highest recycling rate of any region in the world, has 1.5 million tonnes incineration capacity and is self-sufficient in managing hazardous waste. High

²³ DoEHLG publication, *National Biodegradable Waste Strategy*, 2006, available at <http://www.environ.ie>

²⁴ EPA publication, *National Waste Database 2004*, 2005, available at <http://www.epa.ie>

recycling rates can be seen in other regions across Europe including Belgium, Denmark, Germany, the Netherlands, Sweden and Switzerland, where high WTE rates are also achieved, as illustrated in Figure A below.



Source: Eurostat, the Statistical Office of the European Communities, <http://epp.eurostat.cec.eu.int>

Figure A. Waste Management strategies in a number of European Countries (2003)

This is a combination of two factors: the reduced availability of suitable landfill sites and the emphasis placed on the waste hierarchy.

WTE is always designed in line with relevant Regional Waste Management Plans, in parallel with ambitious recycling targets. This recognises that there remains a certain amount of recyclable and biodegradable material in residual MSW, from which WTE is capable of extracting useful energy. This is recognised in the *National Biodegradable Waste Strategy*²⁵, which expresses the urgency of building WTE facilities to help Ireland meet EU biodegradable landfill diversion targets²⁶. In the absence of WTE, biodegradable waste would continue to be sent to landfill in Ireland. This is clearly against EU waste policy, is far less energy efficient, and would have a negative impact on Ireland's greenhouse gas emissions.

²⁵ DoEHLG, *National Biodegradable Waste Strategy*, 2006, available at <http://www.environ.ie>.

²⁶ Targets for Member States are set out in the EU Landfill Directive 1999/31/EC. Ireland's targets have been postponed by a 4 year derogation, and are now to reduce BMW sent to landfill by 75% of the total amount (by weight) of BMW produced in 1995 by 2010. Ireland is currently behind in meeting these targets.

Appendix B : District Heating in Denmark and Sweden

District heating has been present in Denmark since the 1950s. Originally, the heat recovered from the incineration process was seen as “waste heat” or “free energy” and therefore, little value was attributed to it. Nowadays, however, it is seen as a valuable energy resource and few thermal power plants operate without the revenue from district heating. Many coal power plants cease operations in summer because there is insufficient heat demand.

There are three main constituents in a district heating system; production, transmission and consumption.

1. Production

Approximately 60% of the heat produced in Denmark for district heating is sourced from WTE. Danish policy requires that heat from WTE be utilised as first priority on a district heating system, as a base load generator. The next priority for the system is heat from efficient power generators such as combined cycle gas turbines (CCGT), and heat from biomass plants. Heat from oil and gas fired plants are used to meet peak loads.

2. Transmission

Technical Aspects

District heating systems are structurally similar to electricity systems, with transmission lines to transport high-energy loads, for greater efficiency, and distribution networks for transporting loads at lower energy from substations to smaller users. Transmission networks can be up to 40 km long, and generally operate at about 115C and 25 bar (condensate return at 60C). Distribution networks operate at temperatures of 90-110C and a pressure of ~ 10 bar. Distributing hot water rather than steam is generally more efficient.

Ownership

Many of the district heating systems were originally built by municipalities. However, in most cases these are now owned and operated by district heating supply companies. In this system, generators sell heat to the district heating supply company on a contractual basis and supply companies manage balancing the system and customer accounts. In some cases, often on smaller systems, WTE act as supply companies.

Pipeline Design

Pipelines are regarded as long-term infrastructure and should be designed to last more than 100 years. Pipes are always installed underground at a minimum depth of 60cm, depending on the presence of other services (e.g. sewers, gas, high voltage cables). The size of piping depends on a number of factors, but as a rule of thumb, a 200MW pipeline would have a diameter of ~ 600mm.

3. Consumption

Most houses built in district heating areas in Denmark have a choice between purchasing a natural gas fired boiler or connecting to the district heating network i.e. installing oil fired boilers is not permitted. Heating from the district heating network is generally the cheapest option.

Pipelines for residential demand are designed to meet the average, rather than the peak, load. Peaking plants are located close to demand in order to supplement peak load.