ANNUAL ENVIRONMENTAL REPORT

Waste Licence Registration No.: **W0167-03**

Licensee: **Indaver Ireland Limited**

Location of Activity: **Carranstown,**
Duleek,
Co-Meath

Attention: **Environmental Protection Agency**
Office of Environmental Enforcement
McCumiskey House, Richview
Clonskeagh Road
Dublin 14

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Appendix 1: E-PRTR 2017
Appendix 2: Energy Efficiency Report 2017

1. Waste Recovery Report

As a recovery option, the waste-to-energy facility can contribute to packaging recovery targets set out under the Packaging Directive (currently 60% recovery). It is estimated that up to 48,000t residual packaging waste in the MSW accepted will be recovered at the facility.

The facility contributed to the national target of diverting 50% household waste from landfill. Approximately 146,639.68 tonnes of municipal type waste (EWC code Chapter 20) was treated at the facility in 2017, compared with 589,693 tonnes[1] household waste disposed of to landfill in the country.

Flue Gas Residue and Boiler Ash are removed from site and where possible sent to an underground salt mine in Germany. This is considered a recovery operation, R5/R11, as the mine is being back-filled with this material in order to stabilise the ground above. Planning permission has been granted to build a solidification plant at the site in order to treat the material for onward use in Ireland. There are plans to move the solidified material from Indaver to an approved outlet in Ireland. The new operation will be similar to the current operation with the salt mine in Germany, with the benefit of treating the waste within Ireland, and reducing the amount of hazardous waste being exported from the island. Construction work on the solidification plant will begin in May 2018 and commissioning of the solidification plant is expected for end of August/beginning of September.

Ferrous metals are recovered from the bottom ash on site using a magnet and sent to metal brokers within Ireland. Indaver are also recovering non ferrous metal from the bottom ash on site using an eddy current system. This began in June 2014 and has been a successful project with good yields of non ferrous metals.

Residue	Tonnage	Recovery Option
Ferrous Metal	3037.24	R4
Non Ferrous Metal	745.96	R4
Flue Gas Residue	9537.06	R5/R11
Boiler Ash	1691.78	R5
Bottom Ash	18215.62	R11a

Bottom ash is currently being landfilled. The bottom ash is generally being used for cover or road making within the landfill which allows the recovery code R11a to be assigned.

[1] *Figures from 2012, From the National Waste Report 2012, EPA*

2. Emissions from the Installation

The E-PRTR attached as Appendix 1 gives an account of the emissions from the installation.

Surface Water Emissions

Surface Water/Pond
The system is monitored continuously at the DCS by the operators. The discharge is checked daily in accordance with the licence. There have been no unusual discharges in 2017. Also, no water can be discharged when the readings are over the trigger levels.

Surface Water Agreed Trigger Levels:

pH	**TOC**	**Conductivity**
6-9	Warning Level 25 mg/L Action Level 30mg/L	Warning Level 1000 μScm^{-1} Action Level 1200 μScm^{-1}

Average Results per quarter for 2017:

Quarter	**pH**	**TOC** mg/L	**Conductivity** μScm^{-1}	**Discharge Volume m^3**
Quarter 1	7.4	10.1	648	3,034
Quarter 2	7.1	14.4	494.2	2,204.9
Quarter 3	6.9	13.4	324.7	3,304
Quarter 4	7.15	8.82	556.46	4,052

3. Waste Management Record, including summary of rejected waste loads

All waste that arrives at the site is planned in advance. It is tracked through our SAP system. It is weighed prior to entry on the weighbridge and this weight is updated within the sales order on SAP. There were no loads rejected in 2017.

Waste accepted in 2017:

WASTE DESCRIPTION	TONNAGE
020103 PLANT TISSUE WASTE	3.7
020304 WASTE UNFIT FOR CONSUMPTION	0.1
020501 FOOD UNSUITABLE FOR CONSUMPTION	82.04
040222 WASTE FROM PROCESSED TEXTILE	19.26
070501* AQUEOUS WASHING LIQUIDS AND MOTHER LIQUORS	6735.96
070512 SLUDGES FROM ON-SITE EFFLUENT TREATMENT	5385.36
070513* PHARMA WASTE SOLID	589.16
070514 PHARMA WASTE SOLID	307.86
080308 WASTE INK SOLUTION	378.64
080318 WASTE PRINTING TONER	12.07
090108 PHOTOGRAPHIC FILMWASTE WITHOUT SILVER	56.41
150102 EMPTY PLASTIC PACKAGING	13.4
150110* EMPTY PACKAGING WASTE	140.17
150202* FILTERS/ABSORBENTS/WIPING CLOTHS	299.92
150203 FILTERS/ABSORBENTS/WIPING CLOTHS	167.41
160107* OIL FILTERS	0.25
160216 WEEE (NON HAZARDOUS)	10.12
160303* OFF SPEC INORGANIC WASTE	2.1
160304 OFF SPEC INORGANIC WASTE	14.89
160305* OFF SPEC ORGANIC WASTE	233.84
160306 OFF SPEC ORGANIC WASTE	114.42
160508* DISCARDED CHEMICALS LIQUID	4.68
161002 AQUEOUS LIQUID WASTES	15.54
170204* MIXED WOOD/PLASTIC/GLASS	0.47
170604 INSULATION	883.1
180104 NON-INFECTIOUS MEDICAL WASTE	17.96
190203 PREMIXED NON HAZ WASTE	3537.84
190208* MIXED AQUEOUS WASTE	38.38
190210 COMBUSTIBLE WASTE	1979.52
190801 SCREENINGS FROM WWTP	43.98
190805 SLUDGES FROM URBAN WASTE WATER	2.96
191206* WOOD CONTAINING DANGEROUS SUBST.	0.43
191210 REFUSE DERIVED FUEL	7760.42
191212 RESIDUE FROM MECHANICAL TREATMENT	51267.04

200101 PAPER AND CARDBOARD	12.24
200127* PAINT/INK/ADHESIVES/RESINS	118.31
200128 PAINT/INK/ADHESIVE/RESINS	0.25
200137* WOOD CONTAINING DANGEROUS SUBSTANCES	1.61
200139 PLASTICS	11.36
200140 METALS	13.93
200301 MUNICIPAL WASTE	145188.9
200307 BULKY WASTE	1293.08
TOTAL	**226759.08**

Waste removed from facility in 2017:

WASTE DESCRIPTION	TONNAGE
16 10 02 Aqueous liquids	1993.18
17 09 04 Mixed Construction and Demolition Waste	112.7
19 01 02 Ferrous Metals	3037.24
19 01 07* Flue Gas Residue	9537.06
19 01 12 Bottom Ash	35245.2
19 01 13* Boiler Ash	1834.37
19 12 03 Non-Ferrous Metal	745.96
20 01 21* Fluorescent Tubes	0.08
20 01 36 WEEE Equipment	1.56
20 03 01 Mixed Municipal Waste	5.12
20 03 04 Septic Tank Sludge	40.02
20 03 08 Wood other than that mentioned in 20 01 37	3.26
TOTAL	**52552.49**

*=Hazardous waste classification

4. Resource Consumption Summary

Parameter	Unit	Total
Waste	tonnes	226,759
Energy		
Fuel (diesel)	m3	265
Electricity	MWh	17,434
Flue gas cleaning additives		
Quicklime	tonnes	2,977
Hydrated lime	tonnes	1,865
Activated carbon	tonnes	99
Expanded Clay	tonnes	214
Ammonia	tonnes	373

Water		
Well water	m^3	70,866

5. Complaints Summary

All Environmental Complaints are dealt with as per the Environmental Complaints Procedure.

There were 15 environmental complaints registered in 2017. However, only 8 of these were attributable to our activities. All 2017 complaints have been closed out.

6. Schedule of Environmental Objectives and Targets

A schedule of environmental objectives and targets were set for 2017 as per section 7. A new schedule has been set up for 2018 as outlined under section 8.

7. Environmental Management Programme-report for 2017

Item	Status	Responsible	Complete
Radiation Detector to be installed at the entrance to the facility	Detector approved by EPA in December 2017. Installation due end of Q2 2018. Commissioning to take place between Q2 and Q3 2018.	Aidan Kennedy	Moved into 2018 Objectives and Targets
Install the pre-treatment plant for the treatment of hazardous residues	Working through tenders and date for breaking ground is May 2018	Oliver Kelly	Moved into 2018 Objectives and Targets
Audit of external outlet which is used by the facility	Irish Lamp Recycling was audited in July 2017	Grace McCormack	Complete
Complete energy audit of the facility	Complete	Rory Murphy	Complete
Develop and implement an action plan for	Complete. Audited and certified to the	Mary Miller	Complete

transition to ISO 14001:2015	new 2015 standard in 23rd May 2017		
New speciation study for bottom ash	Test programme completed in August 2017. Results for bottom ash received in December	Grace McCormack	Moved into 2018 Objectives and Targets
Lighting	Lights to be replaced by energy efficient LED bulbs	Rory Murphy	Complete
Upgrade of the surface water network	Must pass hydrostatic tests	Rory Murphy	Moved into 2018 Objectives and Targets

8. Environmental Management Programme-proposal for 2018

2018 Schedule of Environmental Objectives and Targets

Item	Status	Responsible	Time frame
Radiation Detector to be installed at the entrance to the facility	Detector approved by EPA in December 2017. Installation due end of Q2 2018. Commissioning to take place between Q2 and Q3 2018.	Aidan Kennedy	Q3 2018
Install the pre-treatment plant for the treatment of hazardous residues	Working through tenders and date for breaking ground is May 2018	Oliver Kelly	Q3 2018
Audit of external outlet which is used by the facility	Included in audit schedule for 2018	Grace McCormack	Q4 2018
Complete energy audit of the facility	In goals for maintenance department	Rory Murphy	Q4 2018
Maintain ISO 14001:2015	Retain certification for	Mary Miller	Q3 2018

	ISO 14001		
New speciation study for bottom ash	Report to be issued to EPA	Grace McCormack	Q2 2018
Upgrade of the surface water network	Must pass hydrostatic tests	Rory Murphy	Q4 2018
Reduce lime consumption by 5% (consumable efficiency)	Not started	Joe Crawley	Q4 2018
Admin building Air Handling Unit heating/cooling controls	To be investigated	Joe Crawley	Q4 2018
The heating/cooling of the locker rooms	To be investigated	Joe Crawley	Q4 2018
Utilise the efficiency of the construction village with regards to heating, cooling, LED lighting upgrade and lighting controls	To be investigated	Joe Crawley	Q4 2018

9. PRTR-report for previous year

As per the PRTR regulations, S.I. No 123 of 2007 requires that Indaver report to the Agency on an annual basis. Indaver submitted their E-PRTR on 20th March 2018 and this is attached in Appendix 1.

10. PRTR-proposal for current year

It is anticipated that Indaver will continue to monitor the air emissions as in 2017. These are TOC, HCl, HF, SO_2, NO_x, CO, dust and dioxins.

11. Noise Monitoring Report Summary

Noise Level Results

Monitoring Point	Date/ Start Time	Monitoring Interval (minutes)	L(A)eq	$L(A)_{10}$	$L(A)_{90}$	Audible Noise Sources
AN1-1	11/09/2017					Low level audible noise from site activities during daytime hours. Road traffic noise from R152 main audible noise source. Some site traffic noise entering and exiting main gate approx. 120m away. Low level noise from incinerator just audible during evening and night time hours.
	11:21	30	**58.5**	62,2	49.6	
	11:52	30	**63.9**	61.5	50.1	
	12:37	30	**59.3**	63.2	50.0	
	21:55	30	**54.9**	60.1	40.7	
	23:06	20	**53.0**	54.8	43.4	
	23:37	20	**52.3**	53.4	42.1	
AN1-2	11/09/2017					Little if any noise from site activities. Road traffic noise from R152 main audible noise source. Some site traffic noise entering and exiting main gate approx. 40m away. Low level noise from incinerator just audible during evening and night time hours.
	12:32	30	**68.4**	72.6	51.5	
	13:04	30	**69.3**	70.4	49.1	
	13:49	30	**70.0**	74.3	54.4	
	22:04	30	**57.1**	61.2	41.2	
	12/09/2017					
	00:05	20	**57.2**	60.1	38.4	
	00:31	20	**54.6**	57.5	36.1	
AN1-3	11/09/2017					Little if any noise audible from site activities. Some site traffic noise entering and exiting main gate approx. 60m away. Road traffic noise from R152 main audible noise source. Low level noise from incinerator emissions just audible during evening and night time hours.
	13:10	30	**61.0**	64.2	51.2	
	13:39	30	**61.8**	63.7	52.3	
	14:41	30	**60.6**	63.9	52.0	
	22:29	30	**50.9**	52.6	43.5	
	23:47	20	**52.1**	55.7	34.8	
	12/09/2017					
	00:29	20	**50.9**	54.9	34.4	
AN1-4	11/09/2017					Forklift operating approx. 90m away and waste trucks unloading approx. 80m away main source of site noise during daytime hours. Noise audible from off site road traffic. Some low level audible noise from bottom ash hall during evening and night time hours.
	10:55	30	53.0	55.8	48.7	
	11:25	30	52.0	54.3	47.7	
	11:56	30	54.0	63.2	50.0	
	21:27	30	44.6	45.6	43.3	
	23:00	20	44.8	46.0	43.1	
	23:23	20	**48.8**	50.5	42.1	

Tonal or Impulsive Noise

Monitoring Point	Time of Day	Tonal or Impulsive Noise from Site Activity	Comments
AN1-1	Day, Evening & Night	No	No significant tonal and impulsive noise from site activities.
AN1-2	Day, Evening & Night	No	No significant tonal and impulsive noise from site activities.
AN1-3	Day, Evening & Night	No	No significant tonal and impulsive noise from site activities.
AN1-4	Day, Evening & Night	No	No significant tonal and impulsive noise from site activities.

Noise levels recorded at AN1-1, AN1-2 and AN1-3 are primarily due to interference noise from road traffic on the R152 which runs adjacent to the front of the Indaver facility and not as a result of Indaver site operations. As we move further from the R152 and closer to the Indaver incinerator the noise levels detected are reduced significantly.

Noise readings at location AN1-4 did not exceed day or evening time noise limits. The second night time reading at AN1-4 was 48.8 dB(LAeq) compared to a limit of 45dB(LAeq). This was due to road traffic on the R152.

The LA90 readings are a truer reflection of noise from Indaver site operations. The LA90 readings were within noise limits at locations AN1-1, AN1-2 and AN1-3 for all readings. The LA90 for the second night time noise level at AN1-4 was also well below the permitted limit of 45dB(A).

The noise levels detected at the site boundary of the Indaver incinerator are not primarily due to Indaver activities but due to off site road traffic.

No tonal or impulsive noise from site activities was recorded during monitoring and therefore LAeq readings did not need to be adjusted to produce LAR noise levels.

In conclusion, noise emissions from the site have a minimal impact on the local environment.

12. Ambient Monitoring Summary

It is a requirement of Schedule C.6.1 of W0167-03 that monthly groundwater monitoring and biannual monitoring of the groundwater monitoring boreholes takes place. Please see below a summary of the results for the same.

AGW1-1 Upgradient Monitoring Point

Monitoring Frequency	TOC(mg/L)	Ammonia (NH4) µg/L as N	Conductivity uscm-1@25C
Jan-17	1.69	18	615
Feb-17	1.58	10	611
Mar-17	2.18	10	619
Apr-17	1.77	10	606
May-17	2.17	9.1	615
Jun-17	1.47	16	614
Jul-17	1.76	14	619
Aug-17	1.54	20	619
Sep-17	2.61	20	618
Oct-17	6.46	20	639
Nov-17	3.2	20	644
Dec-17	2.4	20	800

AGW1-2 Downgradient Monitoring Point

Monitoring Frequency	TOC(mg/L)	Ammonia (NH4) µg/L as N	Conductivity uscm-1@25C
Jan-17	0.49	10	744
Feb-17	0.44	10	742
Mar-17	0.96	16	746
Apr-17	0.72	10	730
May-17	1.07	19	768
Jun-17	0.49	18	769
Jul-17	0.46	4	786
Aug-17	0.41	20	825
Sep-17	1.72	20	802
Oct-17	1.67	20	782
Nov-17	1.9	20	790
Dec-17	1.5	20	673

AGW1-3 Downgradient Monitoring Point

Monitoring Frequency	TOC(mg/L)	Ammonia (NH4) µg/L as N	Conductivity uscm-1@25C
Jan-17	0.64	10	636
Feb-17	0.47	10	636
Mar-17	1.12	10	640
Apr-17	0.62	10	642
May-17	1.18	24	641
Jun-17	0.5	10	639
Jul-17	0.46	13	634
Aug-17	0.44	20	707
Sep-17	1.81	20	630
Oct-17	2.21	20	621
Nov-17	3.9	20	650
Dec-17	1.8	20	655

Biannual Results

	AGW1-1	AGW1-2	AGW1-3	AGW1-1	AGW1-2	AGW1-3
	24/05/2017	24/05/2017	24/05/2017	11/09/2017	11/09/2017	11/09/2017
pH	7.3	7.3	7.3	7.4	7.4	7.4
Nitrate(mg/L as N)	2.43	6.63	9.31	1.57	6.49	8.96
Nitrite(mg/L as N)	<0.002	<0.002	<0.002	<0.007	<0.007	<0.007
Chloride (mg/L)	22.31	106.112	45.75	28.8	124	53.3
Fluoride (mg/L)	0.15	0.12	0.14	0.15	0.12	0.19
Metals-Cd (ug/L)	0.637	0.291	0.344	<1	<1	<1
Metals Tl (ug/L)	0.107	<0.06	<0.06	<1	<1	<1
Metals Hg (ug/L)	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Metals Pb (ug/L)	13.41	3.42	1.919	6.64	1.5	4.77
Metals Cr (ug/L)	3.687	4.876	2.445	<3	4.19	<3
Metals Cu (ug/L)	25.74	10.88	6.945	6.32	8.65	13.19
Metals Mn (ug/L)	630.7	142.1	67.63	253	103.3	118.7
Metals Ni (ug/L)	10.2	2.523	3.172	4.21	2.05	6.56
Metals As (ug/L)	3.045	0.946	1.087	1.38	<1	1.77
Metals CO (ug/L)	2.764	0.532	1.115	1.26	<1	2.68
Metals V (ug/L)	8.433	2.588	4.276	2.98	1.36	6.05
Metals Sn (ug/L)	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Organohalogens	<5	<5	<5	<5	<5	<5
Total coliforms(no/100ml)	27	5	4	360	0	750
Faecal Coliforms(no/100ml)	0	0	0	20	0	0

Overall it can be stated the activities on the site at W0167-03 has no significant impact on the groundwater quality as can be shown by the above results.

13. Tank and pipeline testing and inspection report

Please see below for summary of bunds tested in 2017.
This testing is followed up on the maintenance programme in SAP.

	Item	SAP Description	Bund Tag	Serial Number	Last Test	Next Test
9	Underground recovered water pit (Dirty Water Pit)	Dirty Water Pit	UYA99-BB009		Jul-17	Jul-20
10	Underground recovered water pit (Clean Water Pit)	Clean Water Pit	UYA99-BB010		Jul-17	Jul-20
11	Underground retetion tank beside the pond/Fire Water Retention tank	Fire Water Retention tank	UYA99-BB011		May-17	May-20
14	Bund Tray in Chemstore Unit for Warehouse	Chemstore MH001 Warehouse	UYA99-BB014	12014	Jul-17	Sep-20
16	2.5m3 Storage tank Ammonia Slab area	Ammonia Pit	UYA99-BB016		Sep-17	Sep-20
17	T41 Transformer Compound in Sub Station	T41 Transformer Compound in Sub Station	UYA99-BB017		Oct-17	Oct-20
19	T4 Bund at Warehouse	T4 Bund at Warehouse	UYA99-BB019		Oct-17	Oct-20
20	New Chemstore - Oil Storage	Chemstore MH003 - Oil Storage-Maint	UYA99-BB020	210514	Jun-17	Jun-20
21	New Chemstore - Tipping Hall	ChemStore MH004 - Tipping Hall	UYA99-BB021	220514	Jun-17	Jun-20
24	Lime Milk Pit	Lime Milk Pit	UYA99-BB024	HTK17 BB001	Jul-17	Sep-20
25	Diesel Filling Station	Diesel Filling Station	UYA99-BB025	EGB110-BB002	Feb-17	Feb-20

14. Reported incidents summary

All Environmental Incidents are dealt with as per the Environmental Incident Investigation and Reporting Procedure.

There were 5 minor incidents reported in 2017. Three of the incidents were related to low temperatures in the furnace. One incident was related to a pink hue in the plume emanating from the stack A1-1. One incident was related to an elevated daily average result for SO2

15. Energy Efficiency audit report summary

An energy audit was completed at the facility in 2017 as required by Condition 7.1.3 of W0167-03. This year the report was combined with another requirement under SI 426 of 2014. Indaver has surpassed the requirement for 0.65 for energy efficiency and so the plant is deemed a recovery facility. The full report is attached in appendix 2.

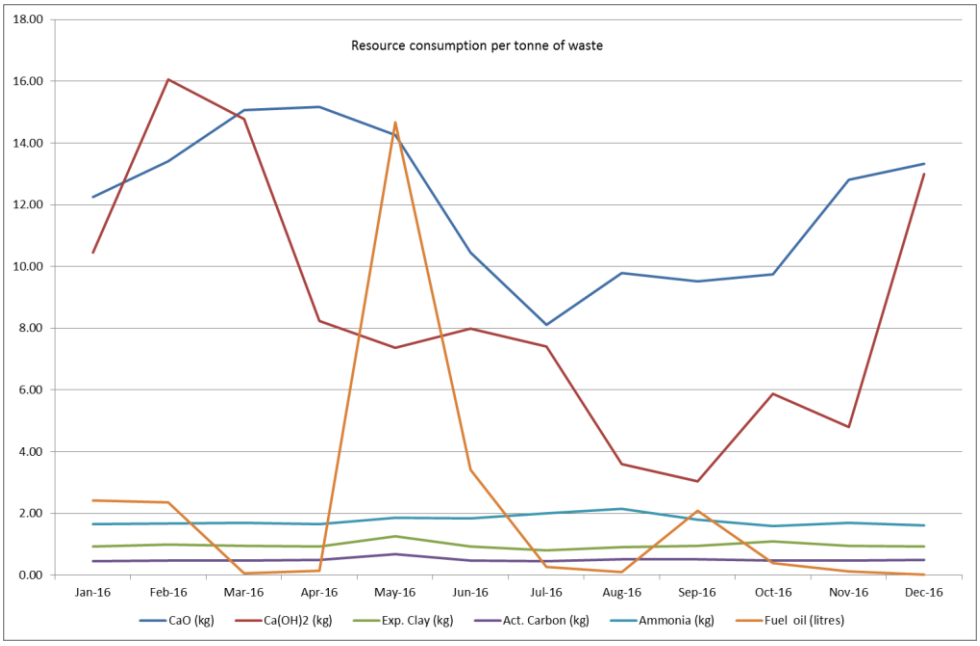
Actions arising out of this audit report have been included in our schedule of objectives and targets.

For the reporting year 2017 Indaver exported 123,466 MWh of electricity to the national grid and imported just 343 MWh.

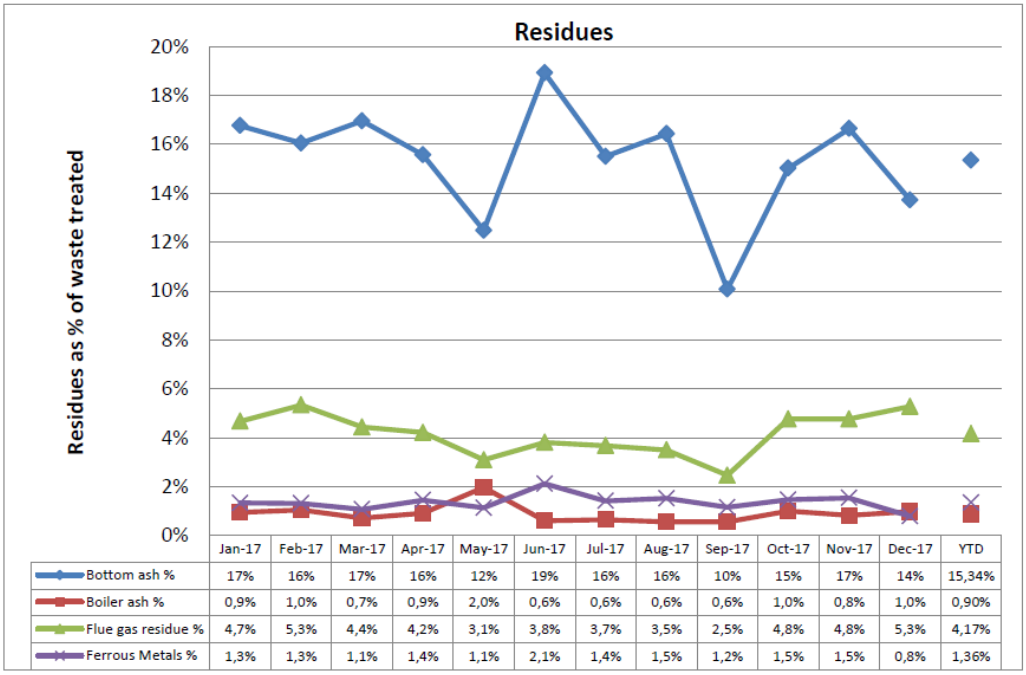
This is a slight decrease in the amount of electricity exported and also a decrease in the amount of energy imported. The decrease in electricity exported was due to more shutdowns and curtailments in 2017 compared to 2016. Indaver produce electricity to run the facility and only import electricity when in shutdown.

16. Report on the assessment of the efficiency of use of raw materials in processes and the reduction of waste generated

Indaver strive to ensure that raw consumables are used to their full effect and this is monitored continuously by the management and staff at the facility. The process engineer is tasked with reviewing this data to ensure that raw materials are used as efficiently as possible. Below is a graph showing the weight of consumable used per tonne of waste processed.



Indaver also strive to ensure that residues are monitored to ensure that the production of residues is kept to a minimum. This is again tracked by the process engineer at the site. The graph below shows the percentage of residues produced per tonne of waste treated. The spike in June 2017 in bottom ash is due to complete emptying of all bottom ash during maintenance works. Some residues are of benefit for example the ferrous metal and non ferrous metal. These residues are sent on to recovery outlets for further treatment. The majority of the residues, bottom ash, boiler ash and flue gas residue, are used as a recovery material.



	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	YTD
Bottom ash %	17%	16%	17%	16%	12%	19%	16%	16%	10%	15%	17%	14%	15,34%
Boiler ash %	0,9%	1,0%	0,7%	0,9%	2,0%	0,6%	0,6%	0,6%	0,6%	1,0%	0,8%	1,0%	0,90%
Flue gas residue %	4,7%	5,3%	4,4%	4,2%	3,1%	3,8%	3,7%	3,5%	2,5%	4,8%	4,8%	5,3%	4,17%
Ferrous Metals %	1,3%	1,3%	1,1%	1,4%	1,1%	2,1%	1,4%	1,5%	1,2%	1,5%	1,5%	0,8%	1,36%

17. Report on progress made and proposals being developed to minimise water demand and the volume of trade effluent discharges

Indaver do not have any effluent discharges from the site. Any water that is generated in the process is re-used within the process. The water demand from the site is not large and water that is used for cleaning purposes on the site is re-used.

18. Development/Infrastructural works summary (completed in previous year or prepared for current year)

Additional drainage to contain potential spillages at the aqueous unloading area was completed in April 2017.

Planning permission has been granted to build a solidification plant at the site in order to treat Flue Gas Residue and Boiler Ash for onward use in Ireland. Currently the material is removed from site and exported prior to being treated, and, where possible, sent to an underground salt mine in Germany. This is considered a recovery operation, R5/R11, as the mine is being back-filled with this material in order to stabilise the ground above. There are plans to move the solidified material from Indaver to an approved outlet in Ireland. The new operation will be similar to the current operation with the salt mine in Germany, with the benefit of treating the waste within Ireland, and reducing the amount of hazardous waste being exported from the island. Construction work on the solidification plant will begin in May 2018 and commissioning of the solidification plant is expected for end of August/beginning of September.

19. Reports on financial provision made under this licence, management and staffing structure of the installation and a programme for public information

A bond is in place for the CRAMP costs at W0167-03 and was approved on 02 October 2015 and is in place until 19 June 2021. An insurance policy is in place for the ELRA costings and was approved by the Agency on the 08 March 2017. The insurance policy is in place until 31 December 2018.

AWN Consulting Ltd has been contracted in order to review the CRAMP and ELRA in 2018.

Management structure at the site has changed and was notified to the Agency on 13th January 2017. The plant is run by a plant manager with a production manager (deputy plant manager), process engineer, maintenance manager and the site is supported by the quality & environmental manager, the health & safety manager and the regional project engineer. The site has production staff of 20 people on a 5-shift pattern which allows the site to run 24/7. There is also a maintenance department of 10 people and these employees comprise the Emergency Response Team.

All communications with interested parties are dealt with as per P0184 Internal & External Communications Procedure. Indaver has several visits per year from interested parties e.g. schools, universities etc. Customers and interested parties also audit the site to assess Indaver's systems and treatment of their waste streams.

Environmental information is made available to interested parties upon request.

Indaver's website, www.indaver.ie, is a valuable source of information for customers and interested parties.

20. Review of decommissioning plan

The decommissioning plan or CRAMP was updated in September 2015 to incorporate hazardous waste being accepted at the facility under the new revision licence W0167-03. This was approved by the Agency prior to the acceptance of hazardous waste at the site. This was reviewed and is still applicable. As previously mentioned in section 19 the CRAMP will be reviewed in Q2 2018.

21. Statement of measures in relation to prevention of environmental damage and remedial actions (Environmental liabilities)

The output of the risk treatment process is the development of a statement of measures to be taken to minimise the environmental risk of the activity. Since its development, the facility has been designed, constructed and operated to minimise risk in every aspect of its operations.

Though additional suitable hazardous waste streams will be accepted at the facility, the same mitigation measures are in place to ensure the risk of an accident or environmental incident at the site is minimised. On the basis of the risks identified above, a statement of measures is not presently considered necessary but Indaver will continue to review operations to identify additional environmental mitigation as the need arises.

22. Environmental Liabilities Risk Assessment Review

The ELRA was reviewed and updated to take account of hazardous waste at the facility. This was approved by the Agency in September 2015. There is an insurance policy in place to cover the financial risks and this was agreed with the Agency in 08 March 2017. The insurance policy is in place until 31 December 2018.As previously mentioned in section 19 , the ELRA will be reviewed in Q2 2018.

23. Summary record of the use of the emergency generator

The emergency generator was used a total of 87 hours in 2017. It is tested weekly and these records are stored at the facility.

24. Summary of audits of waste disposal, treatment and recovery sites for the incinerator residues from the installation

During 2011, Indaver Group audited K&S, the facility for the recovery of our flue gas residues and boiler ash. The facility was approved for use and continued use.

Hammond Lane, the facility which accepts the ferrous metal from the site was audited in March 2014. The facility was approved for continued use.

United Metal, the facility which accepts the ferrous metal from the site was audited in May 2016. The facility was approved for continued use.

Rilta, the facility which accepts oil from the site was audited in December 2016. The facility was approved for continued use.

Irish Lamp Recycling, the facility which accepts waste fluorescent lighting was audited in July 2017. The facility was approved for continued use.

25. Report on particulates monitoring

Please refer to Appendix 1 - E-PRTR.

26. Waste activities carried out at the facility

The primary operation on the Meath Waste-to-Energy Facility is the incineration of non hazardous wastes with associated energy recovery in the form of steam which is used to generate electricity. In 2015 the licence was reviewed and this now allows the acceptance and treatment of 10,000 tonnes of some suitable hazardous waste annually.

In general terms, the Meath WtE Facility is designed to incinerate and recover energy from the residual fraction of non-hazardous household, commercial and industrial waste, non-hazardous wastewater sludge and some suitable hazardous waste also. It consists of an incineration plant with energy recovery and ancillary services, and the throughput of the facility for incineration is 235,000tpa.

The facility comprises of the following main elements:

- The main process building (comprising of tipping hall, waste bunker, furnace, boiler, steam turbine, flue gas treatment and ash storage) including the control room and administration offices
- A building housing the air cooled condenser
- A contractors' compound and office accommodation
- A warehouse building with a workshop
- A transformer compound and ESB substation with emergency generator
- A security building with weighbridge at facility entrance
- A process/firewater water storage tank and fire pump house.

The main process building is approximately 160 m long, 40 m wide at the widest point and 40 m above ground at the highest point. The stack is 65 m tall and vents the treated combustion gases to atmosphere. The plant is based on conventional grate furnace technology with a horizontal steam boiler and an advanced flue gas treatment system designed to meet the current emissions regulations. The plant will produce up to 21 MW electricity of which approximately 18MW is exported to the national grid.

Waste is transported to the site by waste contractors in accordance with the site's licensed opening hours. On entering the site, waste contractors follow a well marked two-way route to the tipping hall where inspections on the waste are conducted by Indaver on a routine basis. There is a large turning area outside the tipping hall to allow the waste delivery vehicles turn safely before entering the hall and a maximum speed limit of 15 km/h. In the tipping hall, waste is deposited into the waste bunker where it is mixed by the crane before being placed in the hopper for the furnace. Liquids are incinerated by way of the direct injection point at the aqueous unloading station or from the storage tank.

In the furnace, the waste is incinerated at temperatures exceeding 850ºC T_2S. The ash collected from the bottom of the furnace passes through a wet bath before being stored for collection and removal from the site. The combustion gases from the process pass through a number of treatment stages. This includes two stages of dosing (lime milk and lime) for acid removal and two stages of dosing (expanded clay and activated carbon) for dioxin removal, before passing through filter bags and being discharged to atmosphere via the emissions stack. The emissions to air are continuously monitored and fed back to the control room for the facility where the levels of dosing can be adjusted if required.

27. Quantity and composition of waste received, recovered and disposed of during the reporting period and each previous year (relevant EWC codes to be used)

The figures below are for incoming waste to the site. All these wastes were received and recovered at W0167-03.

Waste accepted to site in 2017:

WASTE DESCRIPTION	TONNAGE
020103 PLANT TISSUE WASTE	3.7
020304 WASTE UNFIT FOR CONSUMPTION	0.1
020501 FOOD UNSUITABLE FOR CONSUMPTION	82.04
040222 WASTE FROM PROCESSED TEXTILE	19.26
070501* AQUEOUS WASHING LIQUIDS AND MOTHER LIQUORS	6735.96
070512 SLUDGES FROM ON-SITE EFFLUENT TREATMENT	5385.36
070513* PHARMA WASTE SOLID	589.16
070514 PHARMA WASTE SOLID	307.86
080308 WASTE INK SOLUTION	378.64
080318 WASTE PRINTING TONER	12.07
090108 PHOTOGRAPHIC FILMWASTE WITHOUT SILVER	56.41
150102 EMPTY PLASTIC PACKAGING	13.4
150110* EMPTY PACKAGING WASTE	140.17
150202* FILTERS/ABSORBENTS/WIPING CLOTHS	299.92
150203 FILTERS/ABSORBENTS/WIPING CLOTHS	167.41
160107* OIL FILTERS	0.25
160216 WEEE (NON HAZARDOUS)	10.12
160303* OFF SPEC INORGANIC WASTE	2.1
160304 OFF SPEC INORGANIC WASTE	14.89
160305* OFF SPEC ORGANIC WASTE	233.84
160306 OFF SPEC ORGANIC WASTE	114.42
160508* DISCARDED CHEMICALS LIQUID	4.68
161002 AQUEOUS LIQUID WASTES	15.54
170204* MIXED WOOD/PLASTIC/GLASS	0.47
170604 INSULATION	883.1
180104 NON-INFECTIOUS MEDICAL WASTE	17.96
190203 PREMIXED NON HAZ WASTE	3537.84
190208* MIXED AQUEOUS WASTE	38.38
190210 COMBUSTIBLE WASTE	1979.52
190801 SCREENINGS FROM WWTP	43.98
190805 SLUDGES FROM URBAN WASTE WATER	2.96
191206* WOOD CONTAINING DANGEROUS SUBST.	0.43
191210 REFUSE DERIVED FUEL	7760.42
191212 RESIDUE FROM MECHANICAL TREATMENT	51267.04

200101 PAPER AND CARDBOARD	12.24
200127* PAINT/INK/ADHESIVES/RESINS	118.31
200128 PAINT/INK/ADHESIVE/RESINS	0.25
200137* WOOD CONTAINING DANGEROUS SUBSTANCES	1.61
200139 PLASTICS	11.36
200140 METALS	13.93
200301 MUNICIPAL WASTE	145188.9
200307 BULKY WASTE	1293.08
TOTAL	**226759.08**

Waste accepted to site in 2016:

WASTE TYPE	WEIGHT (T)
020304 WASTE UNFIT FOR CONSUMPTION	17.8
020501 FOOD UNSUITABLE FOR CONSUMPTION	80.2
070511* WWTP SLUDGE	0.06
070512 WWTP SLUDGE	4708.9
070513* PHARMA WASTE SOLID	597.852
070514 NON HAZ SOLID WASTE	21.74
070514 PHARMA WASTE SOLID	616.846
110110 SLUDGES AND FILTERCAKES	2.76
150102 EMPTY PLASTIC PACKAGING	1.792
150110* EMPTY PACKAGING WASTE	131.128
150202* FILTERS/ABSORBENTS/WIPES ORG	109.334
150203 FILTERS/ABSORBENTS/WIPES	92.74
160216 WEEE (NON HAZARDOUS)	38.46
160303* OFF SPEC LIQUID	0.001
160303* OFF SPEC SOLID	0.3
160304 OFF SPEC LIQUID	12.764
160304 OFF SPEC SOLID	3.54
160305* OFF SPEC LIQUID	136.951
160305* OFF SPEC SOLID	101.307
160306 OFF SPEC LIQUID	66.64
160306 OFF SPEC SOLID	226.098
160508* DISCARDED CHEMICALS LIQUID	3.997
161002 AQUEOUS WASTE	11.3
170204* MIXED WOOD/PLASTIC/GLASS	1
170503* SOIL AND STONES	0.5
170505* DREDGING SPOIL	0.5
170604 INSULATION	990.18
170903* C&D WASTE MIXED	0.76
180104 NON-INFECTIOUS MEDICAL WASTE	9.24
190203 PREMIXED NON HAZ WASTE	6746.76

190805 SLUDGES FROM URBAN WASTE WATER	19.96
191003* AUTOMOTIVE SHREDDER RESIDUE	1
191206* WOOD CONTAINING DANGEROUS SUBST.	0.5
191210 RDF	8041.26
191212 RESIDU FROM MECH. TREATM.	45024.62
191303* SLUDGES FROM SOIL REMEDIATION	0.498
200101 PAPER AND CARDBOARD	0.26
200127* PAINT/INK/ADHESIVES/RESINS	111.052
200128 PAINT/INK/ADHESIVE/RESIN LIQUID	0.66
200137* WOOD CONTAINING DANGEROUS SUBST.	0.64
200138 TIMBER	1.56
200139 PLASTICS	27.52
200140 METALS	26.551
200301 MUNICIPAL WASTE	154822.14
200307 BULKY WASTE	1591.392
07 05 12 NON HAZ ORGANIC SLUDGE	66.38
07 01 01* Aqueous washing liquids and mother liquors	26.24
07 05 01* Aqueous washing liquids and mother liquors	4103.734
07 05 11* Sludges from on-site effluent treatment containing hazardous substances	600.18
08 03 08 Aqueous sludges containing ink	381.56
Total	**229579**

Waste accepted to site in 2015:

EWC	Description of waste	Weight (Kg)
020203	020203 FOOD ANIMAL ORIG UNFIT FOR CONSUM	8460
020304	020304 WASTE UNFIT FOR CONSUMPTION	18560
020501	020501 FOOD UNSUITABLE FOR CONSUMPTION	139560
070512	070512 WWTP SLUDGE	4518020
070513	070513* PHARMA WASTE SOLID	49033
070514	070514 NON HAZ SOLID WASTE	35800
070514	070514 PHARMA WASTE SOLID	510007
080318	080318 WASTE PRINTING TONER	5800
110110	110110 SLUDGES AND FILTERCAKES	2320
150106	150106 EMPTY MIXED PACKAGING	2200
150110	150110* EMPTY PACKAGING WASTE	567
150202	150202* FILTERS/ABSORBENTS/WIPES ORG	1967
150203	150203 FILTERS/ABSORBENTS/WIPES	83000
160304	160304 OFF SPEC LIQUID	19499
160304	160304 OFF SPEC SOLID	820
160305	160305* OFF SPEC SOLID	220
160306	160306 OFF SPEC LIQUID	2720
160306	160306 OFF SPEC SOLID	236083
160508	160508* DISCARDED CHEMICALS LIQUID	47
170604	170604 INSULATION	942880
180104	180104 NON-INFECTIOUS MEDICAL WASTE	7240
190203	190203 PREMIXED NON HAZ WASTE	8274620
190805	190805 SLUDGES FROM URBAN WASTE WATER	37780
191006	191006 SHREDDINGS FROM METAL CTG WASTE	776040
191212	191212 RESIDU FROM MECH. TREATM.	45425120
200111	200111 TEXTILE	1900
200127	200127* PAINT/INK/ADHESIVES/RESINS	13840
200140	200140 METALS	2840
200301	200301 MUNICIPAL WASTE	165810150
200307	200307 BULKY WASTE	74039
02 01 07	ASH TREES	760
16 10 02	HIGH WATER WITH GLYCOL	236540
07 05 12	NON HAZ ORGANIC SLUDGE	103460
16 01 07*	OIL FILTERS	100
07 05 01*	PRODUCTION PROCESS LIQUID WASTE	15140
08 03 08	WASTE INK SOLUTION	308280
16 10 02	WATER FROM FIREPOND	44620

28. Full title and a written summary of any procedures developed by the licensee in the year which relates to the facility operation

Procedure Reference	Procedure Title	Department	Purpose
P0358	On Call System	Plant Meath	The purpose of this procedure is to outline the requirements of the on call system.
P0393	Bottom Ash Transport	Plant Meath	The purpose of this procedure is to define the actions taken when bottom ash is removed from wet de-slaggers and transported to ash hall at the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0395	Caustic -Sodium Hydroxide- Delivery	Plant Meath	The purpose of this procedure is to define the actions to be taken when Caustic (Sodium Hydroxide) is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0400	Cooling Air Systems	Plant Meath	The purpose of this procedure is to explain the operation of the furnace cooling air systems.
P0403	Diesel Delivery	Plant Meath	The purpose of this procedure is to define the actions to be taken when Light Fuel Oil(MGO) is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0405	Expanded Clay Delivery	Plant Meath	To define the actions to be taken by operators when Expanded Clay is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0408	Flue Gas Residue Loading	Plant Meath	The purpose of this procedure is to define the actions to be taken when Flue Gas Residue(FGR) is removed from the Flue Gas Residue silos and is transported off site at the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.

P0409	Furnace Hydraulic System	Plant Meath	The purpose of this procedure is to explain the operation of the furnace hydraulic system.
P0412	Hydrated Lime Delivery	Plant Meath	To define the actions to be taken by operators when Hydrated lime(Ca(OH)2) is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0414	ID Fan	Plant Meath	To define the actions to be taken during the running of the ID Fan. The plant is fitted with one ID fan which is located downstream of the bag house filter, in order to maintain the entire flue gas path from the furnace to the inlet side of the fan under negative relative pressure and to maintain under pressure in the furnace. This under pressure prevents egress of flue gas from the boiler and flue gas path to atmosphere.
P0415	Lab Loop	Plant Meath	The purpose of this procedure is to explain the operation of the Lab Loop. The LAB loop is located downstream of the spray dryer absorber and is designed in order to have good mixing and sufficient contact time between the reagents(activated carbon, hydrated lime, recirculated residue from the maturation silo) and the pollutants(HCL, SO2, dioxins/furans, heavy metals). It is used to create a reactive layer(cake) on the bags of the fabric filter.
P0417	Lubricant Supply Pump	Plant Meath	The purpose of this procedure is to outline the steps to be taken to bring the furnace lubrication supply system into operation.
P0419	Nitric Acid Delivery	Plant Meath	The purpose of this procedure is to define the actions to be taken when Nitric Acid(27%) is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people. Nitric acid is used in the flue gas cleaning section of the

			process to clean the pipework and the atomizer which carries the lime milk from the pumps to the spray dryer to prevent blockages.
P0421	Pre Start Checks	Plant Meath	The purpose of this procedure is to detail the checks necessary on the boiler system prior to starting up.
P0422	Primary Air and Preheater	Plant Meath	The purpose of this procedure is to explain the operation of the primary air system and primary air preheater. The primary air fan is the fan which blows air through the grates to maintain the combustion of the waste on the grate. The primary air system consists of the primary air fan, two inlet dampers for the primary air fan, 8 primary air dampers, the primary air preheater, and related ducting and instrumentation.
P0424	Quicklime Delivery	Plant Meath	Quicklime is mixed with water to make lime milk which is injected into the flue gas stream in the spray dryer to neutralise the acids in the flue gas.
P0427	Salt Delivery	Plant Meath	The purpose of this procedure is to define the actions to be taken when Salt(NaCl) is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0428	Secondary Air	Plant Meath	The purpose of this procedure is to explain the operation of the secondary air system. Secondary air is air which is injected into the furnace over the grate. The secondary air system consists of a secondary air fan, three secondary air dampers and the associated ductwork and instrumentation.
P0429	SNCR.docx	Plant Meath	The SNCR (Selective Non Catalytic Reduction) system is a system whose purpose is to reduce the level of harmful nitrogen oxides (NOx) in the flue gases to acceptable levels. The SNCR system consists of a 55000L storage tank for ammonium

			hydroxide, two dosing pumps, a demineralised water pumping station, two mixing/dosing cabinets, a PLC for controlling the system , 12 injection lances, and associated pipework.
P0440	Water Soot Cleaner	Plant Meath	The purpose of this procedure is to outline the steps to be taken in the operation of the water soot cleaner. The water soot cleaner is used to clean the second and third passes of the boiler. The water soot cleaner consists of a pump, trolley containing a hose on a reel, running rail for the trolley, tubes which enter the boiler, and pneumatic knifegate valves for each tube.
P0531	EDIL Operating Procedure	Plant Meath	The purpose of this procedure is to inform production operators in the Meath Waste to Energy plant how to operate the Electronic Dispatch Instruction Logger (EDIL) system when declaring the available power output from the turbine to the Eirgrid National Control Centre (NCC).
P0120	General Fire and Evacuation Procedure	QESH	The purpose of this procedure is to detail the evacuation procedures to be followed and to ensure that drills are carried out properly and in a timely manner.
P0291	Management Review Meetings	QESH	This procedure outlines the process by which management conduct a formal evaluation of the status and adequacy of the Quality, Environmental, Safety and Health Management System.
P0186	Internal Resources Management	QESH	The scope of the review shall include the entire organisation and all its activities, products and services.
P0361	Preparation of Monthly Report	Plant Meath	The purpose of this procedure is to define the actions needed to prepare the monthly production report for the Meath Waste to Energy facility. The monthly production report is prepared monthly to measure how the plant is performing and access performance against budget.

P0385	Activated Carbon Delivery	Plant Meath	The purpose of this procedure is to define the actions to be taken when Activated Carbon is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0387	Ammonia Delivery	Plant Meath	The purpose of this procedure is to define the actions to be taken when Ammonia Solution (NH_4OH) is delivered to the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0390	Boiler Ash Loading	Plant Meath	The purpose of this procedure is to define the actions to be taken when Boiler Ash(BA) is removed from the Boiler ash silo and is transported off site from the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people.
P0391	Boiler Ash Transport	Plant Meath	The purpose of this procedure is to define the actions taken when Boiler Ash is removed from the process and transported to the Boiler Ash Silo at the Carranstown Waste to Energy Facility and to outline the responsibilities of the relevant people. Boiler Ash is ash residue removed from the $2^{nd}/3^{rd}$ boiler pass, Superheaters 3,2,1a,1b, and the economiser by means of screws and a drag chain transport system.
P0396	Caustic -Sodium Hydroxide- Dosing	Plant Meath	The purpose of this procedure is to describe the steps to be taken to prepare for operation and use the caustic (Sodium Hydroxide)dosing equipment.
P0406	Expanded Clay	Plant Meath	To define the actions to be taken during the Running/Injection of Expanded Clay to the Spray Dryer Absorber. The Expanded Clay system is the first stage in the Flue gas treatment for the adsorption of dioxins/furans content in the flue gas.
P0557	Procedure Unloading into	Plant Meath	The purpose of this procedure is to detail the steps to be taken when

	Baker Tank		sampling or unloading aqueous waste material into the Baker tank for injection into furnace.
P0300	Radiation Procedure	QESH	The primary purpose of this procedure is to ensure that any exposure to ionising radiation is as low as reasonably practicable to employees of Indaver Ireland Ltd., to members of the public and to any other persons such as visitors or contractors to the site. These procedures also aim to ensure compliance with the provisions of the relevant legislation and licence requirements
P0389	Auxillary Oil Burners	Plant Meath	The purpose of this procedure is to detail the operation of the Auxiliary Oil Burners. The diesel burners are used to heat the furnace from cold to a t2s of 850 °C to allow waste feeding to commence, to cool the furnace down at a controlled rate. The Oil burners system consists of a diesel storage tank, two diesel pumps, propane bottles, two diesel burners, two combustion air fans and all associated pipework.
P0396	Caustic -Sodium Hydroxide- Dosing	Plant Meath	The purpose of this procedure is to describe the steps to be taken to prepare for operation and use the caustic (Sodium Hydroxide) dosing equipment. The caustic dosing equipment is used to keep the pH of the boiler drum within the range 9.4 to 10.0. It is important to keep the pH of the drum within these ranges as pH's below the recommended level can cause corrosion to the boiler, and pH's above the recommended level can result in caustic cracking in the boiler, both of which will considerably shorten the lifetime of the boiler.
P0204	ME1 - Calculating Recovery Code R1 Status	Plant Meath	The purpose of this procedure is outline the method for validating the recovery (R1) status for ME1, which is required by the EPA in the plant's

			Waste Licence. The R1 calculation is used to demonstrate that the Meath facility qualifies as a recovery activity under the R1 code.
P0479	Meath Shutdown Procedure	Plant Meath	The purpose of this procedure is to describe the shutdown management concept and the link with all applicable maintenance procedures. The Shutdown organisation must be ready and able to carry out all the planned and unplanned activities during the shutdown period.
P0345	Working On High Tension	Plant Meath	This procedure sets the rules and authorisations to access and switch the HV 38KV and 10 KV breakers. The 38kV supply to Carranstown 38kV station is fed from Rathmullan 38kV station. ESB operates all 38kV equipment up to and including the 38kV line disconnect (DL) in Carranstown 38kV station. The DL and DLE are property of Meath Waste to Energy Facility.
P0563	Testo Analyser Procedure	Plant Meath	This procedure describes the calibration procedure associated with Emissions Monitoring at the Indaver Meath WTE Facility. This procedure aims to ensure a reliable Emissions Monitoring measurement. The correct function of the associated instrumentation at the emission lab is an essential for compliance with Indaver's Production License.
P0573	Fitz Scientific Chain of Custody	QESH	The purpose of this procedure is to ensure that a sample with a specific I.D. is tracked from collection from Indaver to delivery to Fitz Scientific. Fitz Scientific will only accept a sample for analysis at its laboratory in Drogheda if the sample travels with Fitz Scientific's official Chain of Custody form (CoC).
P0360	Electricity Profiles Nomination	Plant Meath	The purpose of this procedure is to define the actions needed to nominate electricity profiles for Meath WtE.

P0346	Maintenance Work Order Flow	Plant Meath	This procedure provides the steps to be taken from the creation to the closing of the work order. It identifies the actions to be carried out and then assigns the responsibilities for each of these actions. The procedure ensures all work orders are recorded and executed in a safe, consistent & efficient manner.
P0349	Calibration Procedure for Flue Gas Measurements	Plant Meath	This procedure describes the calibration procedure associated with Emissions Monitoring at the Indaver Meath WTE Facility. This procedure aims to ensure a reliable Emissions Monitoring measurement. The correct function of the associated instrumentation at the emission lab is an essential for the compliance with Indaver's Production Licence.
P0386	Activated Carbon	Plant Meath	To define the actions to be taken during the running/injection of Dioxorb 812 AK (Carbon mix) to the Lab Loop. Activated Carbon is injected into the flue gas stream at the top of the LAB loop to remove organic contamination such as dioxins, furans and heavy metals from the flue gas.
P0388	Analyzers	Plant Meath	The purpose of this procedure is to ensure that all relevant persons, in particular the operators at the DCS, have an awareness of the role of the analysers in the safe functioning of the plant. Also to be aware of the restrictions or limits on certain values of parameters that are measured by the various analysers.
P0392	Bottom Ash to Landfill	Plant Meath	The purpose of this procedure is to move bottom ash from Indaver Meath to an Irish landfill. Bottom ash is created when waste is incinerate and is stored in the bottom ash hall.
P0394	Bunker Management	Plant Meath	This document aims to provide an overview of Bunker Management, what is involved and who is responsible for it. It will also explain

			the use and general maintenance of the two Kone cranes.
P0430	Steam and Condensate Cold Field Start Up	Plant Meath	The purpose of this procedure is to instruct operators in the Meath waste to energy facility what actions are required to start the steam and condensate cycle from a cold condition where all system components have been completely cooled, isolated and drained for maintenance work during a plant shutdown.
P0533	Blue alert	Plant Meath	The purpose of this procedure is to describe the actions required during a blue alert. A blue alert is given by the national grid control centre when there is a possibility of a black out on the national grid. There are three levels of warning orange, red and blue. Blue is the most severe.
P0583	Waste Composition Analysis Survey Procedure	Plant Meath	The purpose of this procedure is to provide an overview of Indaver's waste characterisation surveys carried out in compliance with relevant guidelines
P0350	Control of Confined Space Entry Procedure	QESH	The purpose of this procedure is to specify the manner in which confined space entry is managed and controlled at the Indaver Ireland & UK Facilities to ensure the safety, health & welfare of persons involved in confined space entry and any other persons that may be affected by the activity.
P0185	Internal External and Customer Audits	QESH	The purpose of this procedure is to specify the method for planning, conducting, recording, following up and reporting on internal quality, environmental and health and safety audits. It also details how the corrective actions and opportunities for improvement highlighted by internal audits are raised. This procedure also outlines the procedure for conducting audits of external outlets. Finally it details the procedure

			to be followed when a customer requests an audit of Indaver.
P0288	Processing Corrective Actions and Opportunities for Improvement - OFIs	QESH	The purpose of this procedure is to provide guidance on the raising and processing of corrective actions and opportunities for improvement using Compass. This system also fulfills the requirement of the various licences to ensure a corrective action system is in place.
P0292	Management of Records	QESH	This procedure details the company records that must be maintained, how they should be maintained and for what length of time. This includes records as required by ISO 9001, ISO 14001 and OHSAS 18001 along with records as determined by the organisation as being required for the effective operation of the management system. It also includes records of internal and external origin.
P0015	Amendment Issue and Control of QESH System Documentation	QESH	The purpose of this procedure is to outline the method for amendment, approval, issue and control of all Quality, Environmental, Safety and Health (QESH) System documentation to ensure that documentation is updated efficiently and that the correct revision of documents is always available to those who need them.
P0534	Indaver Scorecard	QESH	The purpose of this procedure is to outline the steps in maintaining the Indaver Scorecard.
P0581	Approval and monitoring of suppliers	QESH	The purpose of this procedure is outline how suppliers of externally outsourced processes, products and services are assessed and approved for use and evaluated for continued use. This procedure applies to all suppliers other than hauliers, waste facilities and general contractors.

P0111	Environmental Complaints	QESH	The purpose of this procedure is to document the steps in receiving, documenting, investigating and resolving environmental complaints.
P0177	Identification and Evaluation of Environmental Aspects	QESH	The purpose of this procedure is to specify the method by which the environmental aspects associated with the activities and services of the company are identified. It outlines the decision making criteria which are set to determine the significance level of an aspect/impact, how the Registers of Environmental Aspects are compiled and maintained and also how the on-going process of evaluation of aspects is assured.
P0059	Commercial Sales for Regional Sales Department	Regional Sales	This purpose of this procedure is to ensure that we have in place with Regional Sales customer contracts for treatment of waste in line with Group Procedures (Power of authorization), agreed Pricing Policy and ISO 9001. All contracts and agreements (which include all side agreements, amendments or variations to original contract must be kept up to date and stored in a secure, accessible location.
P0523	Electricity permits and licences compliance - Commercial	Regional Sales	The purpose of this procedure is to outline obligations and procedures for meeting these obligations as set out in licences, agreements and codes applicable to electricity exports and imports for the Meath waste-to-energy facility.
P0383	Completing WTF and TFS Paperwork	Operations	The Purpose of this procedure is to outline the steps to correctly complete WTF and TFS paperwork for shipments of waste from a customers site.
P0561	Meath Site Tour and Visitor Procedure	Plant Meath	The purpose of this procedure is to set out the guidelines for booking site visits to Meath.
P0585	TFS processing for the acceptance of waste from Northern Ireland	Plant Meath	The purpose of this procedure is to outline the acceptance of waste from Northern Ireland to Meath in line with the requirements of the waste

	at the Meath WtE Facility		shipment regulations (WSR), S.I. 419 of 2007.
P0443	Pump Change Over	Plant Meath	The purpose of this procedure is to detail what pumps need to be switched between duty and stand by. It also details who can switch them out and when they can be switched out.
P0328	Training and Staff Competence	HR	The purpose of this procedure is to detail the level of competence and training required of all personnel and sub-contractors to enable them to carry out their activities. It also aims at explaining the way training administration is organised, as well as presenting tools that can be utilised to ensure an appropriate level of training is met within the Company.
P0462	Moving Hazardous and Non Hazardous bulk and packaged IWS waste to Indaver Meath	Operations	The purpose of this procedure is to define the steps taken in moving hazardous and non hazardous IWS waste to Indaver Meath.
P0202	Engineering Management of Change	Regional Engineering	This procedure describes the steps to be followed when undertaking, modifications/projects to new or existing facilities/installations.
P0397	Common Shut Down	Plant Meath	The purpose of this procedure is to assist the DCS/field operator when shutting down the plant from fully operational conditions to cold conditions and to outline the main responsibilities of the relevant people.
P0589	Uploading of waste inspection checklists for Meath plant to SAP	Plant Meath	The purpose of this procedure is to complete uploading of all waste inspection checklists for Meath plant to SAP. For every load of palletised hazardous and non hazardous waste delivered to site a waste inspection checklist F0363-1 must be completed. These Waste Inspection checklists are completed by either the Hazardous waste production Coordinator, DFDS personnel or production personnel

P0590	Uploading laboratory analysis reports for Meath plant to MOSS	Plant Meath	The purpose of this procedure is to demonstrate how to upload laboratory analysis reports for Meath plant to MOSS.
P0538	Waste Non Conformity Procedure	Sales & Marketing IWS	This procedure involves deviations/abnormalities that may occur in the execution of customer orders (deliveries on Indaver-sites or at third party sites on behalf of Indaver, transport & additional services).
P0179	Identification, review and evaluation of legal requirements & compliance obligations	Plant Meath	The purpose of this procedure is to outline the method for identifying new legislation relevant to our activities, reviewing implications to the company, evaluating compliance, designing actions to ensure compliance and communicating implications to those working under the control of the organisation and other relevant interested parties. It also outlines the method used to evaluate the company's compliance with all relevant legislation.
P0487	Injection Of Polluted Water into the Furnace	Plant Meath	This document aims to provide an overview of the Polluted Water Injection, what is involved and who is responsible for it. It will also explains the use and general maintenance of the system.
P0363	Waste Handling	Plant Meath	This procedure covers waste handling in the Meath Waste to Energy facility. It covers all movements of waste from the security gate to the feeding hopper.

29. Review of nuisance controls

Indaver ensures that the following do not cause nuisance at the site – vermin, birds, flies, mud, dust, litter and odour. Vermin is controlled by an external contractor who comes to site monthly and reviews the status of the site. There is no issue with vermin at the site. Birds are monitored to ensure they are not causing nuisance. Flies are not an issue at the site. Mud, dust, litter and odour are taken care of through good operational practices at the site. Negative

pressure in the tipping hall and bunker area ensures that no odours escape. It also ensures that dust and windswept litter are minimised. A road sweeper comes to site on a monthly basis as a minimum which ensures no mud and dust is present to cause a nuisance. Litter picks are completed as and when necessary. Routine odour assessments are also undertaken at the site.

Appendix 1

E-PRTR 2017

Guidance to completing the PRTR workbook

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2017

1. FACILITY IDENTIFICATION

Parent Company Name	Indaver Ireland Limited
Facility Name	Indaver Ireland Limited (Duleek)
PRTR Identification Number	W0167
Licence Number	W0167-03

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Carranstown
Address 2	Duleek
Address 3	Meath
Address 4	
	Meath
Country	Ireland
Coordinates of Location	-6.39215 53.6765
River Basin District	IEEA
NACE Code	3821
Main Economic Activity	Treatment and disposal of non-hazardous waste
AER Returns Contact Name	Grace McCormack
AER Returns Contact Email Address	grace.mccormack@indaver.ie
AER Returns Contact Position	Quality and Environmental Manager
AER Returns Contact Telephone Number	041 213 4005
AER Returns Contact Mobile Phone Number	086 046 4224
AER Returns Contact Fax Number	N/A
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	39
User Feedback/Comments	There were some changes of +/-50% between 2016 and 2017 in the air emissions figures. The low result reported in 2016 for heavy metals was a computational error, and when this is accounted for the difference between the two years is not significant. The result for mercury is higher in 2017 and this can be attributed to a brief trip which occurred in the plant abatement system while quarterly stack emission testing was being simultaneously conducted in June. Other fluctuations in emissions results can be attributed to the characteristics of the waste types being fed.
Web Address	www.indaver.ie

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5(b)	Installations for the incineration of non-hazardous waste in the scope of Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste
5(c)	Installations for the disposal of non-hazardous waste
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	No
Have you been granted an exemption ?	No
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4. WASTE IMPORTED/ACCEPTED ONTO SITE

Guidance on waste imported/accepted onto site

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities) ?	

This question is only applicable if you are an IPPC or Quarry site

Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
02	Carbon monoxide (CO)	M	OTH	EN 14181 (Continuous monitoring using FTIR)	6979.61	6979.61	0.0	0.0
03	Carbon dioxide (CO2)	M	OTH	EN 14181 (Continuous monitoring using FTIR)	302714232.0	302714232.0	0.0	0.0
80	Chlorine and inorganic compounds (as HCl)	M	OTH	EN 14181 (Continuous monitoring using FTIR)	1083.14	1083.14	0.0	0.0
84	Fluorine and inorganic compounds (as HF)	M	OTH	EN 14181 (Continuous monitoring using FTIR)	151.03	151.03	0.0	0.0
21	Mercury and compounds (as Hg)	M	EN 13211:2001		12.81	12.81	0.0	0.0
08	Nitrogen oxides (NOx/NO2)	M	OTH	EN 14181 (Continuous monitoring using FTIR)	198281.52	198281.52	0.0	0.0
86	Particulate matter (PM10)	M	OTH	US EPA M01A	249.94	249.94	0.0	0.0
47	PCDD + PCDF (dioxins + furans)(as Teq)	M	EN 1948-1 to3:2003		0.0000038	0.0000038	0.0	0.0
11	Sulphur oxides (SOx/SO2)	M	OTH	EN 14181 (Continuous monitoring using FTIR)	50100.7	50100.7	0.0	0.0
05	Nitrous oxide (N2O)	M	OTH	TGN M22	1386.72	1386.72	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
210	Dust	M	OTH	EN 14181	112.2	112.2	0.0	0.0
351	Total Organic Carbon (as C)	M	OTH	EN 14181 (Continuous monitoring using FID)	708.79	708.79	0.0	0.0
347	Total heavy metals	M	EN 14385:2004		24.14	24.14	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

Landfill: Indaver Ireland Limited (Duleek)

Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Facility Total Capacity m3 per hour	
Total estimated methane generation (as per site model)	0.0				N/A	
Methane flared	0.0				0.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	0.0				N/A	

4.2 RELEASES TO WATERS

Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this only concerns Releases from your facility

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
No. Annex II	Name	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
No. Annex II	Name	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
Pollutant No.	Name	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.3 RELEASES TO WASTEWATER OR SEWER

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.4 RELEASES TO LAND

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD				QUANTITY	
			Method Used				
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD				QUANTITY	
			Method Used				
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Please enter all quantities on this sheet in Tonnes

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
To Other Countries	06 01 06	Yes	0.0	other acids	D10	M	Weighed	Abroad	Indaver Ireland Limited,W0036-02	Tolka Quay Road,Dublin Port,D1,D1,Ireland	Abfall Verwertungs Gesellschaft Gmb (AVG),IB2234/AVG-GENB-2,Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany	Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany
To Other Countries	06 02 03	Yes	0.0	ammonium hydroxide	D10	M	Weighed	Abroad	Indaver Ireland Limited,W0036-02	Tolka Quay Road,Dublin Port,D1,D1,Ireland	Abfall Verwertungs Gesellschaft Gmb (AVG),IB2234/AVG-GENB-2,Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany	Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany
To Other Countries	06 02 04	Yes	0.0	sodium and potassium hydroxide	D10	M	Weighed	Abroad	Indaver Ireland Limited,W0036-02	Tolka Quay Road,Dublin Port,D1,D1,Ireland	Abfall Verwertungs Gesellschaft Gmb (AVG),IB2234/AVG-GENB-2,Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany	Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany
To Other Countries	13 02 08	Yes	0.0	other engine, gear and lubricating oils	D10	M	Weighed	Abroad	Indaver Ireland Limited,W0036-02	Tolka Quay Road,Dublin Port,D1,D1,Ireland	Abfall Verwertungs Gesellschaft Gmb (AVG),IB2234/AVG-GENB-2,Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany	Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany
Within the Country	13 05 07	Yes	0.0	oily water from oil/water separators	D9	M	Weighed	Offsite in Ireland	Enva Ireland Ltd,196-1	MacAnulty Clear Drains,John F Kennedy Industrial Estate John F Kennedy Road,Naas Road,Dublin 12,Ireland	Enva Ireland Ltd,196-1,MacAnulty Clear Drains,John F Kennedy Industrial Estate John F Kennedy Road,Naas Road,Dublin 12,Ireland	MacAnulty Clear Drains,John F Kennedy Industrial Estate John F Kennedy Road,Naas Road,Dublin 12,Ireland
To Other Countries	13 07 01	Yes	0.0	fuel oil and diesel	D10	M	Weighed	Abroad	Indaver Ireland Limited,W0036-02	Tolka Quay Road,Dublin Port,D1,D1,Ireland	Abfall Verwertungs Gesellschaft Gmb (AVG),IB2234/AVG-GENB-2,Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany	Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany
Within the Country	13 08 99	Yes	0.0	wastes not otherwise specified	R9	M	Weighed	Offsite in Ireland	Rilta Environmental,W0192-03	Block 402,Greenogue Business Park,Rathcoole,Dublin,Ireland	Rilta Environmental,W0192-03,Block 402,Greenogue Business Park,Rathcoole,Dublin,Ireland	Block 402,Greenogue Business Park,Rathcoole,Dublin,Ireland
To Other Countries	15 02 02	Yes	0.0	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	D10	M	Weighed	Abroad	Indaver Ireland Limited,W0036-02	Tolka Quay Road,Dublin Port,D1,D1,Ireland	Abfall Verwertungs Gesellschaft Gmb (AVG),IB2234/AVG-GENB-2,Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany	Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany
To Other Countries	16 05 04	Yes	0.0	gases in pressure containers (including halons) containing dangerous substances	D10	M	Weighed	Abroad	Indaver Ireland Limited,W0036-02	Tolka Quay Road,Dublin Port,D1,D1,Ireland	Abfall Verwertungs Gesellschaft Gmb (AVG),IB2234/AVG-GENB-2,Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany	Borsigstr. 2,D-22113 Hamburg,Hamburg,D-22113 Hamburg,Germany
Within the Country	16 10 01	Yes	0.0	aqueous liquid wastes containing dangerous substances	D9	M	Weighed	Offsite in Ireland	Rilta Environmental,W0192-03	Block 402,Greenogue Business Park,Rathcoole,Dublin,Ireland	Rilta Environmental,W0192-03,Block 402,Greenogue Business Park,Rathcoole,Dublin,Ireland	Block 402,Greenogue Business Park,Rathcoole,Dublin,Ireland

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	16 10 02	No	0.0	aqueous liquid wastes other than those mentioned in 16 10 01	D9	M	Weighed	Offsite in Ireland	EPS Dundalk and Drogheda WWTW,EPS Pumping & Treatment Systems	Dundalk WWTW,Lower point road,Co-Louth,Co-Louth,Ireland		
Within the Country	16 10 02	No	0.0	aqueous liquid wastes other than those mentioned in 16 10 01	D9	M	Weighed	Offsite in Ireland	Rilta Environmental,W0192-03	Block 402,Greenogue Business Park,Rathcoole,Dublin,Ireland		
Within the Country	16 10 02	No	216.16	aqueous liquid wastes other than those mentioned in 16 10 01	D9	M	Weighed	Offsite in Ireland	Dublin City Council Ringsend Waste Water Treatment Plant,D0034-01	Drainage Services Environmental and Engineering Dept,Civic Office,Wood Quay,Dublin 8,Ireland		
Within the Country	17 02 01	No	0.0	wood	R13	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	17 04 05	No	0.0	iron and steel	R13	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	17 05 04	No	0.0	soil and stones other than those mentioned in 17 05 03	D15	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	17 06 04	No	0.0	insulation materials other than those mentioned in 17 06 01 and 17 06 03	D15	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	17 09 04	No	112.7	mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	R13	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	19 01 02	No	0.0	ferrous materials removed from bottom ash	R4	M	Weighed	Offsite in Ireland	Hammond Lane Metal Company Limited,WFP-DC-0013-01	Pigeon House Road,Ringsend,Dublin 4,Ringsend,Ireland		
Within the Country	19 01 02	No	0.0	ferrous materials removed from bottom ash	R4	M	Weighed	Offsite in Ireland	Clearcircle Metals (Limerick) Limited,WFP-LC+KC-11-001-01	Ballysimon Road,Ballysimon Road,Limerick,Limerick,Ireland		
Within the Country	19 01 02	No	0.0	ferrous materials removed from bottom ash	R12	M	Weighed	Offsite in Ireland	AES t/A Midland Waste Disposal Company Limited,W0131-02	Clonmagadden,Proudstown, Navan,Co-Meath,Ireland		
Within the Country	19 01 02	No	0.0	ferrous materials removed from bottom ash	R4	M	Weighed	Offsite in Ireland	Multimetal Recycling,WFP-WW-10-0014-02	Conway Port Industrial Estate,Bollarney,Murrough,Wicklow,Ireland		
Within the Country	19 01 02	No	3025.14	ferrous materials removed from bottom ash	R4	M	Weighed	Offsite in Ireland	United Metals,WFP LK 2013 147A R1	Eastway Business Park,Ballysimon,Ballysimon,Limerick,Ireland		
Within the Country	19 01 02	No	0.0	ferrous materials removed from bottom ash	R4	M	Weighed	Offsite in Ireland	Wilton Waste Recycling Limited ,WFP CN 15-003-01	Kiffagh,Crosserlough,Ballyjamesduff,Cavan,Ireland		
To Other Countries	19 01 02	No	0.0	ferrous materials removed from bottom ash	R4	M	Weighed	Abroad	Indaver NV,MLAV1/9800000485/MV/bd	Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium		
To Other Countries	19 01 07	Yes	9221.32	solid wastes from gas treatment	R5	M	Weighed	Abroad	K&S Kali GmBH,LicenceM76D310/57	Reutilisation Salt Mines(Phillippstaal),Nipper StraBe 33,36269 Philippsthal,36269 Philippsthal,Germany	K&S Kali GmBH,LicenceM76D310/57, Reutilisation Salt Mines(Phillippstaal),Nipper StraBe 33,36269 Philippsthal,36269 Philippsthal,Germany	Reutilisation Salt Mines(Phillippstaal),Nipper StraBe 33,36269 Philippsthal,36269 Philippsthal,Germany

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
To Other Countries	19 01 07	Yes	0.0	solid wastes from gas treatment	D9	M	Weighed	Abroad	Indaver NV,MLAV1/9800000485/MV/bd	Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium	Indaver NV,MLAV1/9800000485/MV/bd,Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium	Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium
To Other Countries	19 01 07	Yes	0.0	solid wastes from gas treatment	R5	M	Weighed	Abroad	K&S,34/Hef-79 n 330-51/153	Werk Werra,Standort Wintershall Herfagrund,36266 Herfa ,36266 Herfa ,Germany	Indaver NV,MLAV1/9800000485/MV/bd,Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium K&S Kali GmbH Werk Werra,AZ.1325/98	Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium
To Other Countries	19 01 07	Yes	315.74	solid wastes from gas treatment	R11	M	Weighed	Abroad	K&S Kali GmbH Werk Werra,AZ.1325/98 AZ6631/99	Standort Unterbreizbach,Untertagaeverwertung Schaet 11,Unterbreizbach,D36414,Germany	AZ6631/99,Standort Unterbreizbach,Untertagaeverwertung Schaet 11,Unterbreihbach,D36414,Germany	Standort Unterbreizbach,Untertagaeverwertung Schaet 11,Unterbreihbach,D36414,Germany
Within the Country	19 01 12	No	14401.028	bottom ash and slag other than those mentioned in 19 01 11	R11a	M	Weighed	Offsite in Ireland	Greenstar Knockharley,W0146-01 Whiteriver Landfill[Louth County Council]	Knockharley,Navan,Co-Meath,.,Ireland Whiteriver and Gunstown Townland ,Dunleer,Co-Louth,Co-Louth,Ireland		
Within the Country	19 01 12	No	0.0	bottom ash and slag other than those mentioned in 19 01 11	D1	M	Weighed	Offsite in Ireland	,W0060-03 Scotchcorner Landfill Monaghan County Council,W0020-02	Letterbane,Annyalla,Castleblayney,Co-Monaghan,Ireland Ballynagran Residual Landfill,Ballynagran,Coolbeg and Kilcandra,Wicklow,Ireland		
Within the Country	19 01 12	No	17029.58	bottom ash and slag other than those mentioned in 19 01 11	R11a	M	Weighed	Offsite in Ireland	Greenstar Holdings Limited,W0165-02	Drehid Landfill(Bord Na Mona PLC),Killinagh Upper,Carbury,Co-Kildare,Ireland		
Within the Country	19 01 12	No	3814.59	bottom ash and slag other than those mentioned in 19 01 11	R11a	M	Weighed	Offsite in Ireland	Drehid Landfill(Bord Na Mona PLC),W201-03			
To Other Countries	19 01 13	Yes	0.0	fly ash containing dangerous substances	D9	M	Weighed	Abroad	Indaver NV,MLAV1/9800000485/MV/bd	Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium	Indaver NV,MLAV1/9800000485/MV/bd,Industriele Afvalverwerking,Poldervlietweg,B-2030 Antwerpen 3,B-2030 Antwerpen 3,Belgium	.,.,.,.,Belgium
To Other Countries	19 01 13	Yes	0.0	fly ash containing dangerous substances	R5	M	Weighed	Abroad	K&S Kali GmbH,LicenceM76D310/57	Reutilisation Salt Mines(Phillippstaal),Nipper StraBe 33,36269 Philippsthal,36269,Germany	K&S Kali GmbH,LicenceM76D310/57, Reutilisation Salt Mines(Phillippstaal),Nipper StraBe 33,36269 Philippsthal,36269 Philippsthal,Germany	Reutilisation Salt Mines(Phillippstaal),Nipper StraBe 33,36269 Philippsthal,36269 Philippsthal,Germany
To Other Countries	19 01 13	Yes	1691.78	fly ash containing dangerous substances	R5	M	Weighed	Abroad	K&S,34/Hef-79 n 330-51/153	Werk Werra,Standort Wintershall Herfagrund,36266 Herfa ,36266 Herfa ,Germany	K & S,34/Hef-79 n 330-51/153,Werk Werra,Standort Wintershall Herfagrund,36266 Herfa ,36266 Herfa ,Germany	Werk Werra,Standort Wintershall Herfagrund,36266 Herfa ,36266 Herfa ,Germany
To Other Countries	19 01 13	Yes	142.59	fly ash containing dangerous substances	D12	M	Weighed	Abroad	K & S ,34/Hef-79n330-51/153	Werra Plant Underground Waste Disposal Plant,Herfa-Neurode,36266 Heringen ,36266 Heringen ,Germany	K & S ,34/Hef-79n330-51/153,Werra Plant Underground Waste Disposal Plant,Herfa-Neurode,36266 Heringen ,36266 Heringen ,Germany	Werra Plant Underground Waste Disposal Plant,Herfa-Neurode,36266 Heringen ,36266 Heringen ,Germany

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
To Other Countries	19 12 03	No	745.96	non-ferrous metal	R4	M	Weighed	Abroad	CRAENHALS METAL TERMINAL,10088	Van Patraestraat 90 ,2660 HOBOKEN (Antwerpen),Antwerp,2660,Belgium		
To Other Countries	19 12 03	No	0.0	non-ferrous metal	R4	M	Weighed	Abroad	Galloo,IHM-AFVAL4024	Wervikstraat 320,8930 Menen,Menen,8930,Belgium		
To Other Countries	19 12 03	No	0.0	non-ferrous metal	R4	M	Weighed	Abroad	Recco Non Ferro Metals BV,OLO Number 1016711	Montage Weg 2,8304 BG Emmeloord,Emmeloord,.,Netherlands		
Within the Country	20 01 36	No	1.56	discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	R13	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	**20 01 38**	**No**	3.26	wood other than that mentioned in 20 01 37	R12	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	20 01 39	No	0.0	plastics	R13	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	20 03 01	No	5.12	mixed municipal waste	R13	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	20 03 01	No	0.0	mixed municipal waste	D15	M	Weighed	Offsite in Ireland	Nurendale Limited trading as Panda Waste Services Limited,W0140 - 03	Rathdrinagh,Beauparc,Navan ,Co Meath ,Ireland		
Within the Country	20 03 01	No	0.0	mixed municipal waste	R1	E	Volume Calculation	Onsite of generati	Indaver Ireland Limited,W0167-02	Carranstown,Duleek,Co-Meath,N/A,Ireland		
Within the Country	20 03 03	No	0.0	street-cleaning residues	R1	M	Weighed	Onsite of generati	Indaver Ireland Limited,W0167-02	Carranstown,Duleek,Co-Meath,N/A,Ireland		
Within the Country	20 03 04	No	0.0	septic tank sludge	D9	M	Weighed	Offsite in Ireland	EPS Dundalk and Drogheda WWTW,EPS Pumping & Treatment Systems	Dundalk WWTW,Lower point road,Co-Louth,Co-Louth,Ireland		
Within the Country	20 03 04	No	14.54	septic tank sludge	D9	M	Weighed	Offsite in Ireland	Dublin City Council Ringsend Waste Water Treatment Plant,D0034-01	Drainage Services Environmental and Engineering Dept,Civic Office,Wood Quay,Dublin 8,Ireland		
Within the Country	20 03 07	No	0.0 0.0 0.0	bulky waste	D1	M	Weighed	Offsite in Ireland	Whiteriver Landfill[Louth County Council] ,W0060-03	Whiteriver and Gunstown Townland ,Dunleer,Co-Louth,Co-Louth,Ireland		
Within the Country	16 10 02	No	1777.02	aqueous liquid wastes other than those mentioned in 16 10 01	D9	M	Weighed	Offsite in Ireland	McBreen Environmental Drain Services Limited,WFP-CN-16-0001-01(1)	Lismagratty,Cavan,Co. Cavan,H12 FP44,Ireland		
Within the Country	19 01 02	No	12.1	ferrous materials removed from bottom ash	R4	M	Weighed	Offsite in Ireland	Glanway Limited,P1015-01	Units 5 & 6 Belview Port,Gorteens,Slieverue,Co. Kilkenny,Ireland		
Within the Country	20 01 21	Yes	0.08	fluorescent tubes and other mercury-containing waste	R4	M	Weighed	Offsite in Ireland	Irish Lamp Recycling Ltd,WFP-KE-14-0072-01	Woodstock Industrial Estate,Athy,Co. Kildare,R14 K889,Ireland	Irish Lamp Recycling Ltd,WFP-KE-14-0072-01,Woodstock Industrial Estate,Athy,Co. Kildare,R14 K889,Ireland	Woostock Industrial Estate,Athy,Co. Kildare,R14 K889,Ireland
Within the Country	20 03 04	No	25.48	septic tank sludge	D13	M	Weighed	Offsite in Ireland	McBreen Environmental Drain Services Limited,WFP-CN-16-0001-01(1)	Lismagratty,Cavan,Co. Cavan,H12 FP44,Ireland		

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					

* Select a row by double-clicking the Description of Waste then click the delete button

Link to previous years waste data
Link to previous years waste summary data & percentage change
Link to Waste Guidance

Appendix 2

Energy Efficiency Report 2017

Indaver Ireland

Energy Audit

Waste Licence W0167-03

2017 Energy Audit

Document Title	Energy Audit
Document No.	2017 Energy Audit
Client	Indaver
Address	Carranstown, Duleek, County Meath

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Introduction

Indaver Ireland has an Industrial Emissions Licence (IED) W0167-03 which was issued by the EPA in 2015. This licence requires that Indaver Ireland complete an energy audit and that the report of this audit be available on site for inspection by the EPA. A summary of this report must also accompany the AER. The scope of the required energy audit is defined by the 'Guidance Note on Energy Efficiency Auditing', published by the EPA, Johnstown Castle, Co. Wexford, Ireland. This report is intended to satisfy the specified scope.

It is noted that whilst the EPA require an energy audit, the plant is relatively new having been built and commissioned in 2011 and has been designed and built with energy efficiency taken into consideration from the start.

Site description

The site includes the following areas

- Offices
- Waste reception hall
- Furnace area
- Turbine Hall
- Maintenance workshops
- Flue Gas Treatment area
- Security and associated weighbridges

The site carries out the following activities that are significant in terms of energy consumption

- Waste incineration

Utilities necessary to support the above activities that are significant in terms of energy consumption are

- Compressed air
- Steam generation
- Conveyor systems
- Steam cooling

Audit

Audit timing

The audit of the site is continuously reviewed by the E & I Lead and a paper based audit afterward.
The weather conditions were normal for the time of year, but weather does not significantly effect energy consumption.

Audit period

December 2016 to December 2017

Audit personnel

The persons involved in the audit where the Process Engineer ; Joe Crawley, the Maintenance Manager; Rory Murphy, Electrical & Instrumentation Supervisor; Eoin Wright and the Quality & Environmental Manager; Grace McCormack.

Scope of audit

The scope of the required energy audit is as defined by the 'Guidance Note on Energy Efficiency Auditing', published by the EPA, Johnstown Castle, Co. Wexford, Ireland.

Additional requirements re the energy audit are contained in Condition 7.1.2 and Condition 7.1.3 of the IED Licence. The scope of the audit includes these conditions which read as follows

7.1.2 The licensee shall build and operate the facility to achieve an energy efficiency of, as a minimum, 0.65 using the formulae below to calculate Energy Efficiency:

Energy Efficiency = [Ep– (Ef + Ei)]/0/97 x (Ew + Ef] where

Emission point = annual energy produced as heat or electricity (GJ/year) (heat produced for commercial use is multiplied by 1.1 and electricity is multiplied by 2.6)

Ef = annual energy input to the system from fuels contributing to the production of steam (GJ/year)

Ew = annual energy contained in the waste input using the net calorific value of the waste (GJ/year)

Only those systems whose energy consumption is significant were examined in detail.

Audit process

The audit process carried out to arrive at the recommendations was as follows:

Review of energy data

It is noted that the plant is a 'waste to energy' plant and therefore bought in electricity is insignificant. The energy data analysed included data for treated waste, steam produced and electricity generated.

Energy Efficiency

Condition 7.1.2 of the Waste Licence sets minimum energy efficiency. The achievement of this parameter is reviewed.

Review of best practice

A literature review was undertaken in 2012 by the external consultant who produced the 2012 report to determine best practice. This included review of the UK Action Energy publications (Good Practice Case Studies, Good Practice Guides and Energy Consumption Guides), BATNEEC Guidance Documents and BREF publications. This review allows identification of any lack of best practice during the audit.

Site audit

During the site audit all areas, processes and systems of energy significance were reviewed under the following six headings

- Whether the systems could effectively modulate energy consumption to production levels, occupancy levels, outside temperature or light levels.
- The extent of any losses from the system (e.g. heat loss, air leaks, friction or drive losses)

- The size of the system in relation to load (e.g. whether , for example, motors are under loaded)
- Whether there is good monitoring system in place (e.g. is energy input metered and production throughput measured, then analysed)
- Whether there is an opportunity for heat recovery and a use for the recovered heat
- Review of the 2016 audit report and the 2017 objectives and targets

Energy Management System

Energy management is an all-encompassing process that should include every aspect of an organisation from finance, human resources and public relations to maintenance, purchasing and planning.

Energy Performance

Site energy performance

It is noted that the plant is a 'waste to energy' facility. The prime objective of the plant is to achieve a volume reduction of the waste material by incinerating the combustible proportion. The waste material is burned in a furnace and steam is produced. The steam is then used in a steam turbine to generate electricity. The electricity, less the house load of approximately 1.8 MW, is exported.

Fork lift trucks are gas (LPG) powered but as this is negligible, it is ignored.

Condition 7.1.3 requires a calculation to be determined for the net usable energy produced per tonne of waste. This calculation was performed and the result is as shown:

Net Usable Energy Per Tonne of Waste Processed	0.64 M Wh/Tonne

Condition 7.1.3 also requires a full breakdown of the calculation of each parameter in the equation and the results for this is shown below:

$$\text{Energy efficiency} = \frac{E_p - (E_f + E_i)}{0.97 * (E_w + E_f)}$$

In which:

E_p *means annual energy produced as heat or electricity. It is calculated with energy in the form of electricity being multiplied by 2.6 and heat produced for commercial use multiplied by 1.1 (GJ/year)*

E_f *means annual energy input to the system from fuels contributing to the production of steam (GJ/year)*

E_w *means annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/year)*

E_i *means annual energy imported excluding* E_w *and* E_f *(GJ/year)*

0.97 *is a factor accounting for energy losses due to bottom ash and radiation*

In addition, Annex II of the WFD highlights that this formula shall be applied in accordance with the Reference Document on Best Available Techniques for Waste Incineration (BREF WI).

Data used: 1st January 2016 to 31st December 2016.

Total waste treated 01/01/16 to 31/12/16	229122	**Tonnes**		
Total electricity produced 01/01/16 to 31/12/16	146550	**MWh**		

Type of energy	**Unit**	**Tonne**	**NCV (kJ/kg)**	**Energy (MWh)**
Adjusted amount incinerated waste		226,327	9,568	601,528
E_w Energy input of waste	**MWh**			**601,528**
Ef: Light fuel oil used for startup / keeping temperature	tonne	120.52	42,000	1,406
Ef: Natural gas used		-	-	-
Ef: Energy input by imported energy with steam	**MWh**			**1,406**
Ei: Light fuel oil used for startup / shutdown	tonne	120.52	42,000	1,406
Ei: Natural gas used	-	-	-	-
Ei: imported electricity (multiplied with equivalence factor 2.6)	-	-	-	
Ei: imported heat	-	-	-	-
Ei: Energy input by imported energy without steam	**MWh**			**1,406**
Ep: Adjusted electricity produced and internally used for incineration process	MWh	18,037.00	-	
Ep: electricity delivered to a third party	MWh	128,514.00	-	
Ep: Electricity produced adjusted for curtailment	**MWh**	**145,926.28**		**145,926.28**
Ep: Heat exported	MWh	-	-	-
Ep: Heat exported	**MWh**	**-**	**-**	**-**
Ep: heat used internally for steam driven pumps, backflow, heating flue gas, liquid APC residues		-	-	-
Ep: for soot blowing without backflow		-	-	
Ep: for heating buildings, deaeration, NH4OH injection		-	-	-
Ep: Heat used internally	**MWh**	**-**	**-**	**-**
Ep	**MWh**			**379,408**
R1				**0.644**
R1 with Climate Correction				**0.72**

R1 Adjustments: Curtailment

Objective:	Omit periods where NCC constrains / curtails plant as energy must be spilt during these periods.
Data affected:	MWh produced, waste tonnes processed
Obtaining data:	MWh produced and waste treated during constraints from NCC
affect of data	Tonnes of waste in 1.1 reduced to exclude contraint periods
	Ep Electrity produced in 5 reduced by electricity producted during contraint

Frequency of processsing data: monthly

Curtailment

	MWh	t waste
Jan-16	9.863	28
Feb-16	69.32	301
Mar-16	36.431	150
Apr-16		
May-16	53.539	313
Jun-16	34.15	205
Jul-16		
Aug-16	42.288	127
Sep-16	131.306	510
Oct-16	15.721	71
Nov-16	61.572	230
Dec-16	169.53	859
Total	**623.7**	**2794.6**

Energy Performance Assessment

The overall energy performance of the site can be determined by considering the energy performance of the different systems (i.e. building lighting, space heating etc). The aim of this approach is to provide an easy to interpret overview of the energy performance of the site and each sub-system in a table format. The method is also repeatable and different auditors should arrive at the same rating. This is of particular value where there is a lack of sub metering.

The performance of each significant[1] sub system is determined by reviewing the separate aspects within it. Each aspect is rated 1 to 3 where

- 1 = Needs improvement
- 2 = Fair
- 3 = Good

All systems have the same generic aspects (for each system, the most significant aspect is marked by *)

- Ability of controls to modulate output to meet demand.
- The extent of losses (air, heat etc)
- Correct sizing of system
- Monitoring
- Options for heat recovery (where applicable)

The performance of each system is therefore determined from the average of the rating of the generic aspects. Thus the rating of each system will range from 1 to 3. The overall score for the site is the average of the ratings for the individual systems. This is shown in Table 1 below.

[1] A significant sub system is defined as a large group of items with similar energy characteristics determined qualitatively that can be treated as an homogenous group for the purposes of investigating energy efficiency measures.

Table 1 Performance of site and systems

System	Significant system	Poor	Fair	Good	Score
Office lighting	No			X	2.80
Shop floor lighting	Yes		X		2.20
Conveyors	Yes		X		2.00
Compressed air generation	Yes		X		1.80
Compressed air distribution	Yes		X		2.40
Steam production	Yes			X	3.00
Process cooling	Yes		X		2.00
Hybrid cranes	No		X		2.20
HVAC	Yes			X	2.60
Overall			X		2.29

Performance Office lighting

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions)			x	3	Occupancy sensors have been put in the office block and fluorescent lighting has been replaced by LED lighting.
Losses (e.g. due to inefficiencies)			x	3	High Frequency control
Sizing of system *			x	3	Light levels correct task
Energy monitoring (e.g. is the energy consumption for this system known)		x		2	Occupancy sensors present and exit signage in place
Heat recovery (e.g. is any waste heat recovered)			x	3	No heat recovery practical
Score			x	2.80	

Performance Shop Floor Process Building lighting

	Poor	Fair	Good	Score	Select a comment
Modulation of output (e.g. ability to adjust output in line with demand or conditions)		x		2	Light switches have been and continue to be installed where routes permit
Losses (e.g. due to inefficiencies)			x	3	High Frequency control
Sizing of system *			x	3	Lux level is correct for task
Energy monitoring (e.g. is the energy consumption for this system known)	x			1	No sub metering at fine enough level
Heat recovery (e.g. is any waste heat recovered)			x	3	No heat recovery practical
Score		x		2.40	

Performance Production equipment (conveyers)

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions) *			x	3	Conveyors run when idle but this is minimal
Losses (e.g. due to inefficiencies)			x	3	Conveyors are regularly checked for alignment and corrective and preventative work orders are generated when required
Sizing of system			x	3	Systems have been accurately sized based on load
Energy monitoring (e.g. is the energy consumption for this system known)		x		2	Conveyors run when idle but this is minimal
Heat recovery (e.g. is any waste heat recovered)			x	3	No heat recovery practical
Score		x		2.80	

Performance Compressed air generation

Compressed air generation refers to air compressors, but excludes driers, filters and the distribution system.

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions) *			x	3	Just one compressor has VSD, this is the lead compressor.
Losses (e.g. due to inefficiencies)			x	3	A VSD compressor runs on load when required and idles when there's no demand
Sizing of system		x		2	No comment
Energy monitoring (e.g. is the energy consumption for this system known)	x			1	No sub metering at fine enough level
Heat recovery (e.g. is any waste heat recovered)		x		2	No heat recovery, no local requirement for heat
Score		x		2.20	

Performance Compressed air distribution

The compressed air distribution system consists of the piping from the compressor to point of use including air receivers, driers and filters.

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions) *			x	3	A VSD compressor runs on load when required and idles when there's no demand
Losses (e.g. due to inefficiencies)			X	3	System is well maintained with no leaks evident
Sizing of system		x		2	No comment
Energy monitoring (e.g. is the energy consumption for this system known)			x	3	Sub metering and data logging

Heat recovery (e.g. is any waste heat recovered)			x	3	No heat recovery practical
Score		x		2.80	

Performance steam production

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions) *			x	3	No comment
Losses (e.g. due to inefficiencies)			x	3	No comment
Sizing of system			x	3	No comment
Energy monitoring (e.g. is the energy consumption for this system known)			x	3	Steam output measured, waste input measured
Heat recovery (e.g. is any waste heat recovered)			x	3	No heat recovery practical
Score			x	3.00	

Performance Process cooling (air cooled condensers)

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions) *			x	3	VSD operated fans
Losses (e.g. due to inefficiencies)			x	3	Fouling of heat exchange surface is monitored
Sizing of system			X	3	System has been sized to run at 100% resulting in high efficiency from the motors and drives
Energy monitoring (e.g. is the energy consumption for this system known)		x		2	Quarterly metering at sub distribution board level now ongoing
Heat recovery (e.g. is any waste heat recovered)			X	3	Exhaust steam to the ACC is at 45 °C limiting any further recovery. Condensate is sent back into the process
Score		x		2.80	

Performance hybrid cranes

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions)			x	3	Crane program is set to only utilize cranes when required. Otherwise, cranes will idle with no consumption
Losses (e.g. due to inefficiencies)			x	3	No Comment
Sizing of system			X	3	Cranes specified against load. Material or process hasn't changed since design
Energy monitoring (e.g. is the energy consumption for this system known)	x			1	No sub metering at fine level.

Heat recovery (e.g. is any waste heat recovered)			x	3	No heat recovery practical
Score		x		2.60	

Performance HVAC

	Poor	Fair	Good	Score	Comments
Modulation of output (e.g. ability to adjust output in line with demand or conditions)			x	3	Variable volume system
Losses (e.g. due to inefficiencies)			x	3	Intake air taken from hot area above boilers
Sizing of system		x		2	No comment
Energy monitoring (e.g. is the energy consumption for this system known)		x		2	Measured and controlled on the BMS system
Heat recovery (e.g. is any waste heat recovered)			x	3	No heat recovery practical as many sources of low grade heat in plant.
Score		x		2.60	

Recommendations

The audit recommendations from the 2016 audit are shown in the table below. These items(items 1, 3 and 4) were put into the objectives and targets for 2017 and the update on these are below.

Table -2 Recommendations

Ref.	Measure	Inter - dependency	Predicted annual savings, kWh	Predicted annual GHG savings, t CO_2	Predicted annual cost saving, €	Capital cost measure, €	Simple payback period, yrs	Capital cost per tonne annual CO_2 savings, €/t
1	Ambient light/occupancy controllers for office lights	None	2,409	0.7	170	1,000	5.9	1361
2	Investigate suitability of ambient light controllers for shop floor	None	22,886	7.0	1,600	1,500	0.9	215
3	Cooler air inlet for air compressor	6	39,814	12.1	2,787	1,000	0.4	82
4	Monitor energy use at finer level	5	823,221	251.1	57,625	10,000	0.2	40
5	Define Energy Policy	4	823,221	251.1	57,625	-	-	0
6	Review air pressure and consider separating instrument air from plant air	3	88,476	27.0	6,195	-	-	0
7	Investigate uses for exhaust steam	None	2,599,092	792.7	181,935		-	0
	Totals		**4,399,119**	**1,342**	**307,937**	**22,500**	**0.07**	**16.8**

Notes

1. GHG savings based on electricity generated being classed as 50% green and displacing electricity with an emission factor of 0.61 g/kWh. Predicted GHG emission savings are therefore 0.305 g/kWh. (Source SEAI).

Ambient light/occupancy controllers office areas

Ambient light/occupancy controllers operate by automatically switching off the lights when the natural light level is sufficient. The occupancy feature of the unit switches off the lights when left in the 'on' position lights if there is no one in the room.

It was noted during the audit that many office areas had good natural daylight yet the light were on, or there was no one in the room and the lights were on.

Rooms with large numbers of lights should be prioritised over rooms with a few lights as the cost of the energy saving measure is more closely related to the number of rooms than installed load.

2017 Objectives and Targets:

An external energy audit completed by Power Therm was issued in December 2016 and they came up with several action areas that we could focus on, these include:

- **Free cooling in the VSD room:** Due to the moderate climate in Ireland, free cooling is possible for a high % of the year. Ambient air could be used to cool the room when temperatures are below 16°C which is approximately 80% of the time. We investigated this possibility and we can't make the recommended changes as the room has to be completely sealed as part of the automated fire detection system, if we dump the Inergen gas in the event of a fire the gas needs to be contained in the room.

- **Improved control of turbine hall extractor fan:** The fan could be used to maintain a room set point temperature, rather than running at a fixed speed. During colder months this would result in savings and the infrastructure to implement the measure is already in place. The Turbine Hall and the Steam & Condensate Area are cooled by a large fan which draws out hot air through ductwork at high level and passively pulls air in from outside through openings in the building fabric. This fan is connected to the BMS and the room temperatures are monitored but the fan does not appear to be controlled, and is running at a constant speed of 50 Hz, drawing 18 kW of power according to its VSD. The fan is at full speed, although the BMS is providing a 75% signal – this requires some investigation to determine why this is. The room temperatures at the time of audit as can be seen in the above screenshots was 29.5 and 27.3 °C respectively. The ambient air temperature was approximately 18 °C. If the strategy was changed to control the fan speed to a room set point of, for instance, 35 °C, then the fan speed could reduce. The BMS would control the fan speed to maintain the temperature in whichever the hotter room is. The power savings would be highest in the winter where the ambient air temperatures are lower, providing more cooling capability. To establish indicative data from reducing the fan speed, site testing was conducted. The fan speed was manually controlled on the VSD for a short period and power readings were taken from the VSD.
    - @ 50Hz power consumption was 18 kW
    - @ 45Hz power consumption was 13.2 kW – Annual savings of 42,050 kWh possible
    - @ 40 Hz power consumption was 9.3 kW – Annual savings of 76,200 kWh possible

The potential annual energy savings have also been calculated above based on maintaining different average fan speeds. The capital costs will be small as it just requires some strategy changes and could be done as part of routine maintenance. We investigated this and found it would be a quick win so we engaged Sygma (AHU controls specialists) and they came to site and made the changes, we agreed on a set point of 30°C to control the fan and we believe an annual saving of €6,478

- **LED lighting upgrade in the Admin:** We made the decision to commit to replacing all the lights in the Admin to LED. We have reached an annual saving of **€1,163**. This has both a visual and financial benefit. There was also a reduction in the number of lights as the LED lights are brighter so less lights were required. S:\Project Meath\93 Operations\934 Maintenance\9364 Goals\E&I\2017\Energy saving 2017.xlsx
- **Led lighting upgrade street lighting**: we also made the decision to commit to replacing all the street lights to LED. Significant savings could be achieved by upgrading the 400W SON fittings to LED. To complete this and stick to the HSA standards we engaged Urbis-schreder to ensure LUX levels are met. Please see attached link for report. S:\Project Meath\93 Operations\934 Maintenance\9351 E & I\93529 FMRs, Small Projects & Investigations\068 Upgrade internal-external led lighting\Documentation\Urbis report.pdf. We have reached an annual saving of **€3,158**. S:\Project Meath\93 Operations\934 Maintenance\9364 Goals\E&I\2017\Energy saving 2017.xlsx

2018 Objectives and targets:

Adhering to the recommendations from the 2016 Power Therm audit the following areas will be investigated further:

- Admin building AHU heating/cooling controls
- The heating/cooling of the locker rooms
- Utilise the efficiency of the construction village with regards to heating, cooling, LED lighting upgrade and lighting controls

Monitor energy use at finer level

UK Good Practice Guide 316 "Undertaking an Industrial Energy Survey," explains the purpose of a monitoring and targeting system:

"*An energy survey can only ever be a snapshot. It is therefore best at detecting opportunities for permanent modifications to plant, equipment, buildings and operating procedures. However, your organisation may be incurring hidden costs through avoidable waste occurring at random and remaining undetected. Examples could include:*

- *Time switches and other self-acting controls failing in the 'on' position.*
- *Maintenance errors, such as fitting an oversized replacement motor.*
- *Operating errors, such as running an air compressor against a closed isolation valve*
- *Lax discipline, for example leaving auxiliaries to run when not required.*
- *Leaks.*

A management technique called Monitoring and Targeting (M&T) is the most effective defence against these kinds of loss, which a one-off survey would miss. The next best option – a regular programme of routine energy inspections – would be a more costly exercise, and would anyway miss many kinds of energy-wasting faults because they are frequently of an unforeseen nature.

M&T works by combining regular consumption data (usually weekly or monthly) with corresponding data on production throughput, weather, or other driving factors (called 'variables' in the older literature). An M&T scheme is primed with targets for each stream of consumption, these targets being related to the relevant driving factor, so that given the level of activity in the facility, a 'correct' ration of energy can be estimated at each point of use. The deviation between actual and expected consumptions indicates the extent of any unexpected loss, which can then be converted to its implied cost in order to establish its significance. When the fault detected in this way proves persistent, the pattern of deviation can be analysed as an aid to diagnosis.

An effective M&T scheme provides, in effect, a continuous review of the site's performance, and as well as revealing random unexpected losses, it can be used to monitor and verify the effectiveness of other energy conservation measures. Verification is doubly significant if your company is engaged in emissions trading."

According to Sustainable Energy Ireland, sites using M&T have achieved savings representing 5 and 25% of the annual fuel bill. A UK Department of Energy Survey found that the average annual savings identified by companies implementing M&T was 13% and in some cases savings in excess of 25% were obtained. A conservative figure of 5% has been assumed for this report.

At present, the electricity consumption of each significant item of equipment is not monitored. However, by fitting sub metering, the energy consumption can be monitored. Examples of possible items or systems to monitor are

- Office lighting on a per floor level
- Production area lighting
- Outside lighting
- Each conveyors or groups of related conveyors
- Air cooled condenser fans
- Each air compressors

The consumption figures, normalised where appropriate, can be plotted on a daily basis and a technique such as Statistical Process Control (SPC) used to analyse the variations. A typical plot of normalised fuel consumption, using this technique but with data from another client is shown below.

Conclusions

Our site's consumption is dynamic with many input variables having an effect on our internal energy consumption as outlined above. Our site has been designed to adapt automatically to the specific requirements on any day such as VSD driven fans slowing or speeding dependant on load requirements and ambient temperatures. Heat Tracing on Conveyors automatically switching itself off when ambient & product temperature are sufficient to maintain required setpoints.

LSS Continuous Improvement Storyboard

Team Names	Aidan Agnew, Production Shift Teams, Maintenance Team,	Project Name	Compressed air usage analysis & reduction	Start Date	01st June 2017
		Department	Meath WtE	End Date	08th September 2017

DEFINE

Project Statement: Compressed air usage has increased over recent months for reasons unknown. Compressors operate with an inefficiency greater than 90% with regards to electrical energy input. Once controlled, any wasted electrical energy would be conserved and administered onto the electrical grid.

Project Goal: Identify the main consumers of compressed air and ensure they are running optimally. We aim to minimise the loss of potential output as heat energy by identifying locations of compressed air usage and reducing wasted air. The aim is to identify areas of excessive consumption and to correct this.

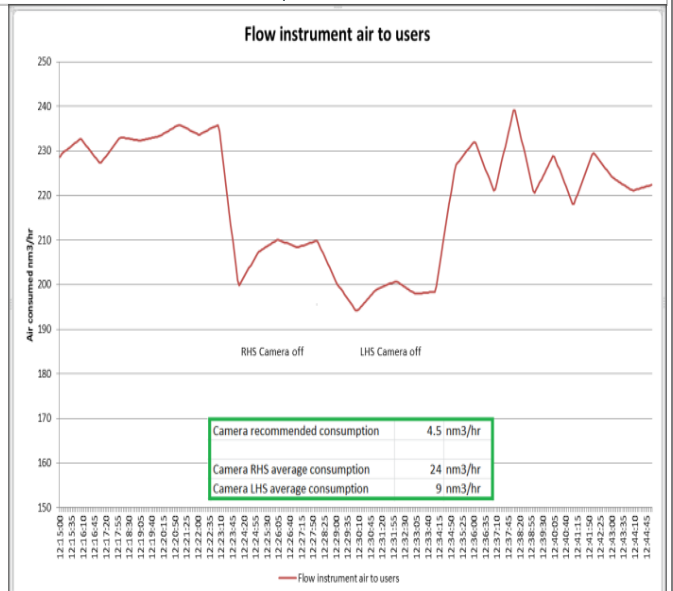
MEASURE

We identified the main consumers and focused where we found wastage:

1. Furnace cameras
2. Silo filter pulsing
3. Air actuated vibrators
4. General leaks found on walk-downs

We held a kick-off meeting with the main stakeholders to detail the project goals and seek feedback and input.

The measure phase predominantly consisted of using the handover files available on MOSS and the s-drive to assign a recommended compressed air consumption to the major air consumers, and then a measurement of what these instruments are actually using.



ANALYSE

The analysis phase mostly consisted of comparison between recommended and actual consumptions.

Furnace Cameras

Specified consumption: 10-30 m3/hour

Actual Consumption: 51 m3/hour

Silo filter air pulsing units

Recommended air consumption: 8.82 m3/hour

Actual consumption: 5.88 m3/hour

General leaks found on walk-downs

Work orders were completed for the correction of these air leaks and they were fixed by the mechanical maintenance team.

Ash Hall Vibrators

Actual Consumption: 41 m3/hour

Cost of running VSD compressor

A survey was undertaken; the hours of the VSD compressor, total compressed air consumption, compressor kilowatt rating, and cost of exporting one kwh of electricity onto the grid were used to ascertain the cost of compressing one m3 of air

Potential Financial savings from reduction of compressed air consumption by furnace cameras		
RHS camera consumption	35	m3/hr
LHS camera consumption	16	m3/hr
Recommended consumption by RHS	5	m3/hr
Recommended consumption by LHS	5	m3/hr
Potential savings made on RHS	30	m3/hr
Potential savings made on LHS	11	m3/hr
Total savings in compressed air consumption	**41**	**m3/hr**
Cost of compressing one m3 of air	€ 0,03	
Financial savings by saving 41 m3 of compressed air	**€ 1,27**	**per hour**
Corresponding savings made per year	**€ 10.354,58**	**per year**

	B	C	D	E	F	G	H	I	J	K	L	M
1												
2												
3	Time	Run hours	Daily Run Hours	m3/day	KW Rating	Daily KWh	Cost KWh	Cost / day	Cost / m3			
4	09:30	44999			183.5	0	0.085	0				
5	09:30	45021	22	10994	183.5	4037	0.085	343.145	0.031		Assumed cost from survey	€ 0.031
6	09:30	45112			183.5	0	0.085	0				
7	09:30	45135	23	10946	183.5	4220.5	0.085	358.7425	0.033			
8	09:30	45158	23	11438	183.5	4220.5	0.085	358.7425	0.031			
9	09:30	45181	23	11414	183.5	4220.5	0.085	358.7425	0.031			
10	09:30	45250	0		183.5	0	0.085	0				
11	09:30	45273	23	11513	183.5	4220.5	0.085	358.7425	0.031			
12	09:30	45296	23	13188	183.5	4220.5	0.085	358.7425	0.027			
13	09:30	45296	0		183.5	0	0.085	0				
14	09:30				183.5	0	0.085	0				
15	09:30				183.5	0	0.085	0				
16	09:30				183.5	0	0.085	0				
17	09:30				183.5	0	0.085	0				
18	09:30				183.5	0	0.085	0				
19	09:30				183.5	0	0.085	0				
20	09:30				183.5	0	0.085	0				
21	09:30				183.5	0	0.085	0				
22	09:30				183.5	0	0.085	0				
23												

IMPROVE

Furnace Cameras

Volumetric flow regulators were ordered to be installed on the air line before the cameras. Using the flow regulators, the flow of air will be steadily lowered until it reaches the value specified in the handover files.

Silo filter air pulsing units

The time between insufflation for these units between air pulses was changed from 20 to 30 seconds. This results in less pulses of air per day; therefore less air is being consumed.

Air actuated vibrators in the ash hall

After plant air consumption by the ash hall vibrators was investigated, it was clear that the consumption was reasonably large (41 m3/hour). The potential financial benefits of switching these air-actuated vibrators to electrical vibrators are detailed below.

Old pulse frequency	20	seconds
No. of seconds in an hour	3600	seconds
No. of pulses per hour	180	pulses
Total volume used per year 1 silo	77263,2	m3
Number of silos	6	
Total volume used per year 6 silo	463579,2	m3
Old total cost / year	€ 14.371	
New pulse frequency	30	seconds
No. of seconds in an hour	3600	seconds
No. of pulses per hour	120	pulses
Total volume used per year 1 silo	51509	m3
Number of silos	6	
Total volume used per year 6 silo	309052,8	m3
New total cost / year	€ 9.581	
Saving	**4.790,32**	

Furnace Cameras

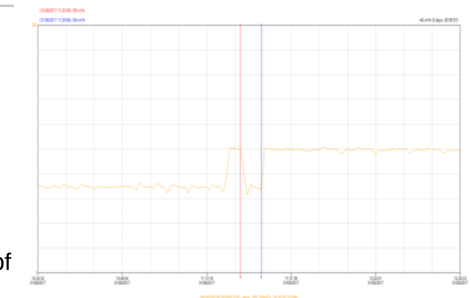
Potential savings of up to 41m3/hour. Up to **€10,020 per year**

Silo filter air pulsing units

Savings of 154,526m3. Realised saving of **€4,790 per year**

Air actuated vibrators

Savings in compressed air to be made if changed to more efficient electrically powered vibrators. Compressed air saving of **€10,020 per year**



Although electrical vibrators would require an initial investment to purchase, install and continually power the total savings in regard to compressed air consumption that could be realised from the project is **€24,830**

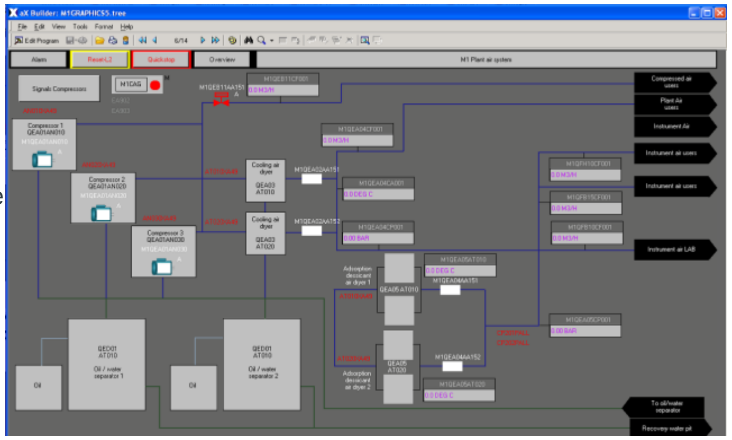
Cost of generating 1m3 of compressed air is €0.031

CONTROL

The main KPI used to monitor continuous performance is the daily instrument and plant air consumption figure

The volume of compressed air consumed is directly correlated with the VSD compressor hours. Plant and instrument air flows are monitored using the DCS and Historian applications.

The daily overview provides a detail on the compressed air usage on a daily basis



Learnings Achieved

- ❑ The value of LSS tools & how to apply them
- ❑ I learned about the major consumers in the plant and whether changes could be made from a process point of view without adversely affecting facility performance
- ❑ The importance of documenting our findings

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Ms. Caroline Kelly,
Environmental Protection Agency,
Office of Environmental Enforcement,
McCumiskey House, Richview,
Clonskeagh Road,
Dublin 14.

29th March 2017.

Re: Request for R1 Energy Certificate 2017 (Indaver Waste to Energy Facility, IE Licence No: W0167-03).

Dear Ms. Kelly,

Please find attached the R1 status report for the Indaver Waste to Energy facility (IE Licence No: W0167-03). Each year Indaver must supply a copy of its R1 calculations in order that a certificate of recovery can be obtained from the EPA, to prove the site is a recovery facility. I have included a copy of the R1 audit report for 2016.

I trust this is to the satisfaction of the Agency, but should there be any further queries please do not hesitate to contact me.

Kind Regards,

Grace McCormack
Quality & Environmental Manager
Indaver Ireland Limited
Carranstown |Duleek |Co-Meath
Tel: +353 41 213 4005
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Web: www.indaver.ie

Indaver Ireland

Energy Audit

Waste Licence W0167-03

2016 Energy Audit

Introduction

This document reflects the licence requirement in Condition 7.1.3 to demonstrate the energy efficiency of the site. Energy Efficiency must be, as a minimum, 0.65. This document reports the result of 0.72.

Audit

Audit period

1st January 2016 to 31st December 2016.

Audit personnel

The persons involved in the audit were the Process Engineer Joe Crawley, the Maintenance Manager, Rory Murphy, Electrical and Instrumentation Supervisor Eoin Wright and the Quality and Environmental Manager, Grace McCormack.

Scope of audit

The scope of the required energy audit is as defined by the 'Guidance Note on Energy Efficiency Auditing', published by the EPA, Johnstown Castle, Co. Wexford, Ireland.

Additional requirements re the energy audit are contained in Condition 7.1.2 and Condition 7.1.3 of the Waste Licence. The scope of the audit includes these conditions which reads as follows:

7.1.2 The licensee shall build and operate the facility to achieve an energy efficiency of, as a minimum, 0.65 using the formulae below to calculate Energy Efficiency:

Energy Efficiency = [Ep– (Ef + Ei)]/0/97 x (Ew + Ef] where

Emission point = annual energy produced as heat or electricity (GJ/year) (heat produced for commercial use is multiplied by 1.1 and electricity is multiplied by 2.6)

Ef = annual energy input to the system from fuels contributing to the production of steam (GJ/year)

Ew = annual energy contained in the waste input using the net calorific value of the waste (GJ/year)

Energy Efficiency

Condition 7.1.2 of the Waste Licence sets minimum energy efficiency. The achievement of this parameter is reviewed.

Energy Performance

Condition 7.1.3 requires a calculation to be determined for the net usable energy produced per tonne of waste. This calculation was performed and the result is as shown:

Net Usable Energy Per Tonne of Waste Processed	0.64 M Wh/Tonne

Condition 7.1.3 also requires a full breakdown of the calculation of each parameter in the equation and the results for this is shown below:

$$\text{Energy efficiency} = \frac{E_p - (E_f + E_i)}{0.97 * (E_w + E_f)}$$

In which:

E_p means annual energy produced as heat or electricity. It is calculated with energy in the form of electricity being multiplied by 2.6 and heat produced for commercial use multiplied by 1.1 (GJ/year)

E_f means annual energy input to the system from fuels contributing to the production of steam (GJ/year)

E_w means annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/year)

E_i means annual energy imported excluding E_w and E_f (GJ/year)

***0.97** is a factor accounting for energy losses due to bottom ash and radiation*

In addition, Annex II of the WFD highlights that this formula shall be applied in accordance with the Reference Document on Best Available Techniques for Waste Incineration (BREF WI).

Data used: 1st January 2016 to 31st December 2016.

	Total waste treated 01/01/16 to 31/12/16	229122	**Tonnes**		
	Total electricity produced 01/01/16 to 31/12/16	146550	**MWh**		

	Type of energy	**Unit**	**Tonne**	**NCV (kJ/kg)**	**Energy (MWh)**
1.1	Adjusted amount incinerated waste		226,327	9,568	601,528
1.2	**E_w Energy input of waste**	**MWh**			**601,528**
1.3	Ef: Light fuel oil used for startup / keeping temperature	tonne	120.52	42,000	1,406
2	Ef: Natural gas used		-	-	-
2.1 + 2.2	**Ef: Energy input by imported energy with steam**	**MWh**			**1,406**
2.3	Ei: Light fuel oil used for startup / shutdown	tonne	120.52	42,000	1,406
3	Ei: Natural gas used	-	-	-	-
3.1	Ei: imported electricity (multiplied with equivalence factor 2.6)	-	-	-	
3.2	Ei: imported heat	-	-	-	-
3.3	**Ei: Energy input by imported energy without steam**	**MWh**			**1,406**
3.4	Ep: Adjusted electricity produced and internally used for incineration process	MWh	18,037.00	-	
4	Ep: electricity delivered to a third party	MWh	128,514.00	-	
4.1	**Ep: Electricity produced adjusted for curtailment**	**MWh**	**145,926.28**		**145,926.28**
4.2	Ep: Heat exported	MWh	-	-	-
5	**Ep: Heat exported**	**MWh**	**-**	**-**	**-**
5.1 + 5.2	Ep: heat used internally for steam driven pumps, backflow, heating flue gas, liquid APC residues		-	-	-
6	Ep: for soot blowing without backflow		-	-	
6.1 to 6.3	Ep: for heating buildings, deaeration, NH4OH injection		-	-	-
6.4	**Ep: Heat used internally**	**MWh**	**-**	**-**	**-**
6.5 to 6.7	**Ep**	**MWh**			**379,408**
7	**R1**				**0.720**

R1 Adjustments: Curtailment

Objective:	Omit periods where NCC constrains / curtails plant as energy must be spilt during these periods.
Data affected:	MWh produced, waste tonnes processed
Obtaining data:	MWh produced and waste treated during constraints from NCC
affect of data	Tonnes of waste in 1.1 reduced to exclude contraint periods
	Ep Electrity produced in 5 reduced by electricity producted during contraint

Frequency of processsing data: monthly

Curtailment

	MWh	t waste
Jan-16	9.863	28
Feb-16	69.32	301
Mar-16	36.431	150
Apr-16		
May-16	53.539	313
Jun-16	34.15	205
Jul-16		
Aug-16	42.288	127
Sep-16	131.306	510
Oct-16	15.721	71
Nov-16	61.572	230
Dec-16	169.53	859
Total	**623.7**	**2794.6**

Office of
Environmental
Enforcement

Environmental Protection Agency
Regional Inspectorate, McCumiskey House
Richview, Clonskeagh Road, Dublin 14, Ireland
An Ghníomhaireacht um Chaomhnú Comhshaoil
Cigireacht Réigiúnach, Teach Mhic Chumascaigh
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Ms. Grace McCormack
Quality & Environmental Manager
Indaver Ireland Limited
Carranstown
Duleek
Co Meath

23rd May 2017 Our Ref: W0167-03/gc30ck

Dear Ms. McCormack,

The Agency has reviewed licensee return LR028063, which reports the result of the R1 energy efficiency calculation for the facility, for the period 1st January 2016 to 31st December 2016 and licensee return LR028814, which provides details on the climate correction factor (CCF) applied to the energy efficiency calculation result.

The Agency notes that the result of the energy efficiency calculation, as contained in the above licensee return for the facility is 0.64 (0.72 with climate correction factor). The Agency can confirm that the licensee is complying with the requirements of condition 7.1.2 of IE licence register number W0167-03, to operate the facility to achieve an energy efficiency of 0.65.

This letter of confirmation is valid for a period of one year, from the date of issue of this letter. The licensee is required to submit a report on the energy efficiency of the facility to the Agency, on an annual basis.

Please contact a member of the OEE Enforcement Team in Dublin, if you have any queries in relation to this matter.

Yours sincerely

Caroline Kelly
Inspector
Office of Environmental Enforcement