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Efficiency Review –
Energy, Raw Materials &
Waste Minimisation

AMG RESOURCES

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ACRONYMS/TERMS USED IN THE TEXT

AMG	AMG Resources Limited
BAT	Best Available Techniques
BREF	Best Available Techniques Reference Document
DAA	Directly Associated Activity
EMS	Environmental Management System
EP	Environmental Permit
ER	Efficiency Review
NRW	Natural Resources Wales

1. INTRODUCTION

1.1. Requirement and Purpose of the Efficiency Review

1.1.1. AMG Resources Limited ("AMG") are required to undertake a number of efficiency audits and report the findings to Natural Resources Wales ("NRW") every 4 years as required by the following Environmental Permit (EPR/BM2381IQ) conditions:

"1.2. Energy Efficiency

1.2.1. The Operator shall:

b) review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities; and

c) take any further appropriate measures identified by a review."

"1.3. Efficient Use of Raw Materials

1.3.1. The Operator shall:

c) review and record at least every four years whether there are suitable alternative materials that could reduce environmental impact or opportunities to improve the efficiency of raw materials and water use; and

d) take any further appropriate measures identified by a review."

"1.4. Avoidance, Recovery and Disposal of Wastes Produced by the Activities

1.4.1. The Operator shall review and record at least every 4 years whether changes to those measures should be made and take any further appropriate measures identified by a review."

1.1.2. The Efficiency Review ("ER") will be split into three sections; energy efficiency, raw materials efficiency and waste minimisation. Each section will be structured as follows:

- a review of the previous year's performance compared to preceding years to establish any identifiable trends;
- an explanation of any trends observed;
- description of current energy efficiency measures;
- identification of areas for improvement; and
- proposed measures to enhance or improve environmental performance.

1.2. Relevant Legislation, Guidance and Environmental Procedures

1.2.1. The following documents were taken into consideration during the preparation of this report:

- *AMG's Environmental Permit ("EP") and subsequent variations* (EPR/BM2381IQ/V006, June 2017) which permits the de-tinning of scrap tin plate under S2.2. A1 (a) activity listed in Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2016, as well as six Directly Associated Activities ("DAA");
- *Best Available Techniques ("BAT") Reference Document ("BREF") for Non Ferrous Metal Industries (published July 2017);*
- NRW '*How to Comply with your Environmental Permit*' (Version 8, October 2014);

and

- *AMG's Environmental Policy and Environmental Management System ("EMS") procedures*.

1.2.2. Previously, tin recovery was the primary operation at the Llanelli site. However, as a result of fluctuations in tin prices, the operations have focused on the physical sorting, compaction and baling of scrap metals to be used within the ferrous sector to manufacture steel since 2014.

1.2.3. Consequently, an EP variation application has been submitted to NRW to propose the inclusion of Section 5.4. A(1)(b)(iv) '*Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day involving…treatment in shredders of metal waste, including waste electrical and electronic equipment and end-of-life vehicles and their components'* as an additional Schedule 1 Activity to best reflect current practices at the Installation. Therefore, the *BREF for Waste Treatment (published October 2018)* has also been considered in this report.

1.3. Report Setting

1.3.1. Due to the significant changes proposed at the Installation as part of the EP variation, the ER will be updated following the first year of operation of the 5.4 activity to provide a baseline for the environmental performance at the Site. The report will then be subsequently updated every 4 years.

2. Energy Efficiency

2.1. Energy Performance

2.1.1. The energy consumption performance of the last 5 years is provided in Table 1.

Table 1: Total Energy Consumption (MWh) – Reporting Period 2014- 2018

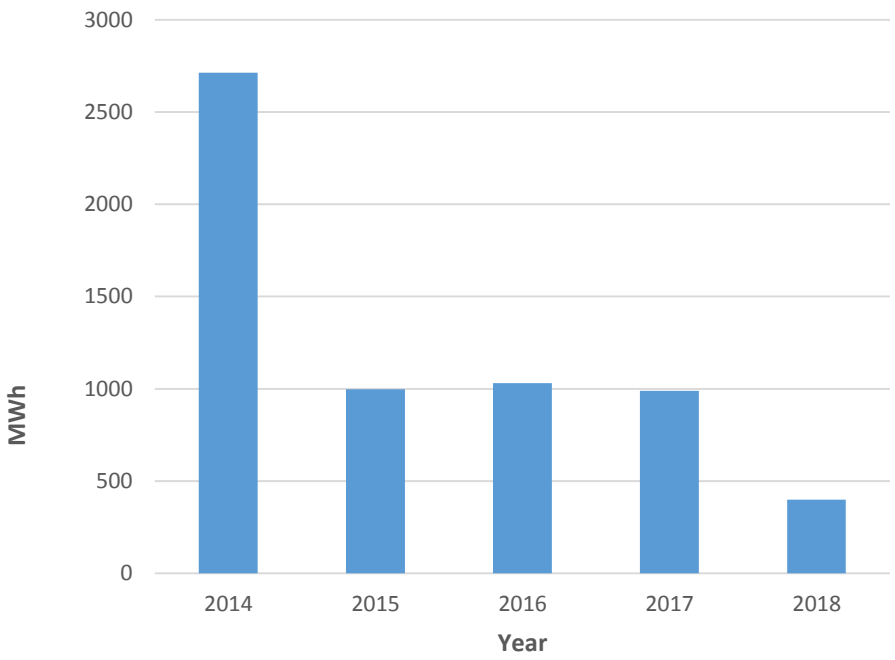
Year	Electricity (MWh)	Gas (MWh)	Total (MWh)
2014	2,714	12,013	14,727
2015	998	131	1,129
2016	1,030	0(1)	1,030
2017	988	0	988
2018	399	0	399

Notes to Table:

(1) The gas boiler was decommissioned on the 29th April 2015. Therefore, no gas was consumed in the process from 2016 onwards. NRW were duly informed at the time of decommissioning.

2.1.2. The electricity consumption (MWh) is also displayed in Figure 1.

Figure 1: Electricity Consumption (MWh) – Reporting Period 2014 - 2018



2.1.3. The electricity consumption per tonne of product (kWh/tonne) is provided in Table 2.

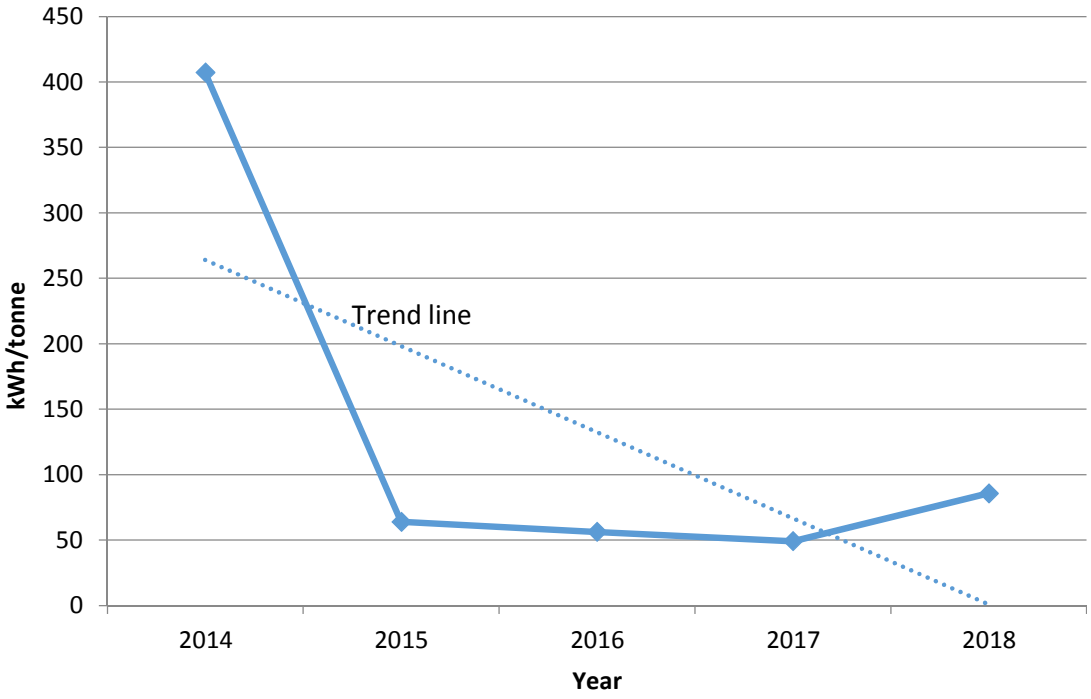
Table 2: Electricity Consumption (kWh) per Tonne of Product – Reporting Period 2014- 2018

Year	Total (MWh)	Total (kWh)	Production (tonnes)	Energy per tonne (kWh/t)
2014	14,727	14,727,000	36,165	407
2015	1,129[(2)]	1,129,000	17,672	64
2016	1,030	1,030,000	18,322	56
2017	988	988,000	20,096	49
2018	399[(4)]	399,000	4,654	86

Notes to Table:
(2) As de-tinning ceased in November 2014, the production in 2015 is significantly different to previous years, hence the significant decrease observed.

2.1.4. The electricity consumption per tonne of product (kWh/tonne) is displayed in Figure 2.

Figure 2: Electricity Consumption per Tonne of Product (kWh/tonne) – Reporting Period 2014 - 2018



2.2. Explanation of Trends Observed

2.2.1. The electricity consumption has decreased by 60% in 2018 compared to 2017 due to the reduction in site operations.

2.2.2. The electricity consumption per tonne of product has increased. Energy efficiency decreases when operations and machinery cease for a time and are subsequently powered up. This results in an energy spike due to the stop start nature of the operations rather than constant running of plant and equipment.

2.2.3. Additionally, AMG began undertaking significant infrastructure work in 2018 in order to facilitate the required improvements to accommodate the proposed 5.4. activity. Therefore, electricity may have been consumed which was not primarily used for the production of finished product but utilised for the improvement works.

2.3. Current Energy Efficiency Measures

2.3.1. The following measures have been implemented at the Site to improve energy efficiency:

- all plant systems are covered by service/maintenance contracts;
- the site operates a policy of switching off systems and machinery when not in use. This policy extends to office and site-wide elements such as lighting;
- a record is kept for each piece of machinery/plant detailing the routine servicing and maintenance that is required;
- all plant motors are inspected on a regular basis;
- switching off electronic equipment when not in use;
- replacing conventional light bulbs with energy efficient light bulbs;
- ensuring lighting and heating is switched off at night;
- thermostatic control of heating and cooling systems;
- draught-proofing measures; and

2.4. Identification of Areas for Improvement and Proposed Measures to Enhance or Improve Performance

2.4.1. As part of the proposed variation, AMG are planning to streamline a number of their processes which will in turn increase the energy efficiency.

2.4.2. Additionally, any new equipment to be purchased will be of the highest energy efficiency rating and all personnel will be trained prior to operation.

2.4.3. Following the improvement works and the introduction of the 5.4 activity, an energy baseline can be established from which further measures to improve energy performance will be identified and implemented.

4. RAW MATERIAL EFFICIENCY

4.1. Raw Material Performance

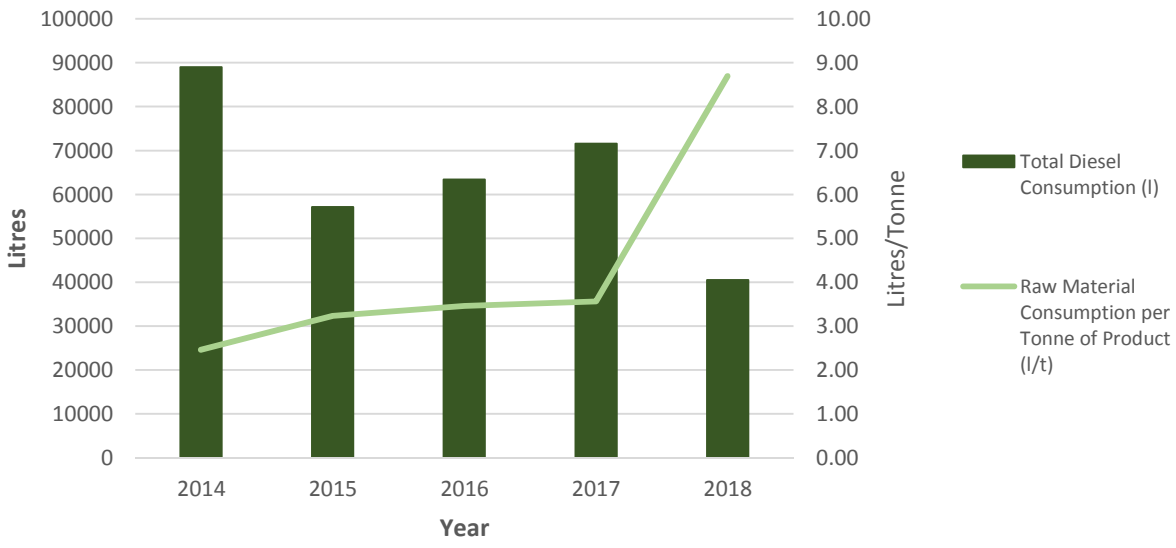
4.1.1. The site consumed 40,477 litres of diesel for the use of mobile plant on site in 2018. The performance of the last 5 years is presented in Table 3 and is displayed in Figure 3.

4.1.2. The site no longer consumes water as part of the process and therefore, water efficiency is not considered in this report.

Table 3: Raw Material Consumption (Litres) per Tonne of Product – Reporting Period 2014 -2018

Year	Total (litres)	Production (tonnes)	Raw Material Consumption per Tonne (l/t)
2014	89,034	36,165	2.46
2015	57,132	17,672	3.23
2016	63,407	18,322	3.46
2017	71,542	20,096	3.56
2018	40,477	4,654	8.70

Figure 3: Raw Material (Diesel) Consumption (litres) – Reporting Period 2014-2018



4.2. Explanation of Trends Observed

4.2.1. Diesel consumption has decreased by 77% in 2018 compared to 2017 due to the reduction in site operations.

4.2.2. The raw material consumption per tonne of product has increased. AMG began undertaking significant infrastructure work to facilitate improvements to accommodate the proposed 5.4. activity. Therefore, diesel was not primarily used for the production of finished product but for the operation of plant and equipment undertaking the improvement works.

4.3. Current Raw Material Efficiency Measures

4.3.1. The following measures are in place to improve raw material efficiency:

- raw material delivery is supervised by site personnel to ensure safe unloading and to prevent any accidental releases/losses;
- all plant systems are covered by service/maintenance contracts;
- daily inspections of mobile plant ensures leakage can be identified promptly and rectified to prevent any losses;
- all personnel are trained in the correct and efficient use of plant and equipment;
- the site operates a policy of switching off systems and machinery when not in use; and
- a record is kept for each piece of machinery/plant detailing the routine servicing and maintenance that is required to ensure they are working in good order.

4.4. Identification of Areas for Improvement and Proposed Measures to Enhance or Improve Performance

4.4.1. As part of the proposed variation, AMG are planning to streamline a number of their processes which will in turn increase the raw material efficiency which is achieved at the site.

4.4.2. Following the improvement works and the introduction of the 5.4 activity, a raw material consumption baseline can be established from which further measures to improve will be identified and implemented.

4.4.3. As part of the updates to the EMS which are planned in 2019, raw material consumption will be monitored and specific targets will be set.

5. WASTE MINIMISATION

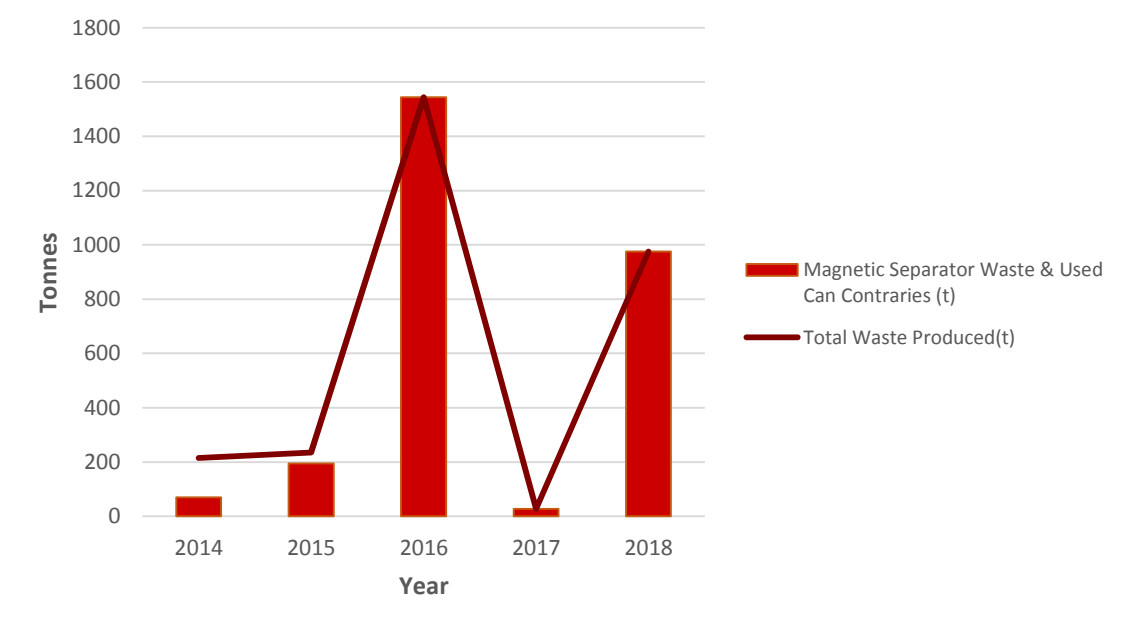
5.1. Waste Performance

5.1.1. Waste performance for the last 5 years is provided in Table 4 and is displayed in Figure 4.

Table 4: Waste Performance (tonnes) – Reporting Period 2014 - 2018

Year	Magnetic Separator Waste & Used Can Contraries (tonnes)	De-tinning Solution Bleed Off (tonnes)	Waste Wood (tonnes)	Contaminated Rain Water (tonnes)	Total (tonnes)
2014	69.7	96.3	-	49.0	215.0
2015	195.0	27.0	13.0	-	235.0
2016	1544.0	-	-	-	1544.0
2017	27.0	-	-	-	27.0
2018	976.0	-	-	-	976.0

Figure 4: Waste Performance (Tonnes) – Reporting Period 2014-2018



5.2. Explanation of Trends Observed

5.2.1. Magnetic separator waste and used can contraries, widely known in the metal sector as “fluff” or “dirt”, is a waste stream produced during the baling of post-consumer packaging and tin off cuts. A build-up of this waste on site has resulted in a significant amount being removed from site for disposal to landfill in 2016 and 2018.

5.3. Current Waste Minimisation Measures

5.3.1. AMG has made considerable effort to re-process this waste material in order to apply the waste hierarchy and reduce the amount of waste being disposed.

5.3.2. The waste is stored on site to enable the material to dry out prior to re-processing. The re-processing extracts any remaining metal which may still be contained within this material.

5.3.3. AMG are currently in discussion with a company specialising in plastics who are investigating the possibility of utilising the plastics contained within this waste stream. NRW will be kept informed of the outcome of these discussions.

5.4. Identification of Areas for Improvement and Proposed Measures to Enhance or Improve Performance

5.4.1. As described in the EP variation application documents, AMG's business model for the 5.4. activity is underpinned by the intent that all materials accepted at site are to be processed in order to be sold as product.

5.4.2. AMG are confident that magnetic separator waste and used can contraries as a result of the proposed 5.4. activity will leave the site, either loose or as bales, under the anticipated EWC Code 19 12 10. If the material meets the required quality specifications, it will be sent to an appropriate Energy from Waste Installation.

6. CONCLUSION

6.1. A review of the efficiency of energy and raw material consumption, as well as waste production and minimisation in 2018 was undertaken in accordance with Condition 1.2, 1.3. and 1.4 of AMG's Environmental Permit.

6.2. Energy and raw material consumption has significantly decreased in 2018 compared to previous years as a result of a reduction in site operations. Consumption per tonne of finished product has increased for both energy and raw material consumption. This is due to the use of plant and equipment in infrastructure works being undertaken at the Site in order to facilitate the improvement works required for the proposed 5.4. activity. Therefore, the consumption was not primarily used for the production of finished product. Additionally, the intermittent use of plant and equipment requiring start up and shut down rather than continuous use can result in spikes of consumption.

6.3. A number of energy and raw material efficiency measures have been implemented at the Site which have been discussed within the report. Following the commencement of 5.4 activities as proposed in the permit variation application currently being determined by NRW, a baseline will be established and further strategies to improve efficiency at the Site will be identified and implemented.

6.4. A review of waste production and performance has identified an increase in magnetic separator waste and used can contraries being sent off site for disposal in 2018.

6.5. AMG has made considerable effort to re-process this waste material to increase metal utilisation and reduce waste production. AMG are currently in discussion with a company specialising in plastics who are investigating the possibility of utilising the plastics contained within this waste stream.

6.6. AMG are confident that the magnetic separator waste and used can contraries as a result of the proposed 5.4. activity will leave the site, either loose or as bales, under the anticipated EWC Code 19 12 10. If the material meets the required quality specifications, it will be sent to an appropriate Energy from Waste Installation.

6.7. Due to the significant changes proposed at the Installation as part of the EP variation, the ER will be updated following the first year of operation of the 5.4 activity to provide a baseline for the environmental performance at the Site. The report will then be subsequently updated every 4 years.