Paul Snowdon

From: John Batch
Sent: 04 February 2016 12:43
To: Sustainable Development Tenders
Subject: FW: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment
Attachments: Invest NI - Carella Laminate Systems Ltd Rev B.pdf

Hi Paul

This is the final agreed version of the report on which I will now complete the PPE

Regards

John

From: Nigel McCormick [mailto:nigel.mccormick@sdsenergy.com]
Sent: 02 February 2016 13:24
To: John Batch <john.batch@investni.com>
Cc: Sustainable Development Tenders <susdevetenders@investni.com>
Subject: Re: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Hi John

Please find attached Revised report.

The report includes the oil at 6p/kWh and I have revised the costs accordingly. It had previously included at 5p/kWh given the low rate that is at currently.

With regards to the Tier 1 and Tier 2 I have spoken with both DETI and Ofgem this morning, and Ofgem confirmed that it is simply the load of the boiler (199kW in this case) multiplied by the 1314 hours for the Tier 1 payment. We have already included the boiler efficiency and seasonal efficiency in our overall kWh calculation. Therefore this does not need to be applied again.

Our table for comparison against both gas and oil baselines indicate savings against these fossil fuels. Therefore the cost of oil has been included for the additional 191,136kWh used of oil/gas over and above the biomass heat generated.

Kind Regards,

Nigel McCormick BEng (Hons) MSc
Senior Energy Engineer

sds complete energy solutions

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a: James House, Quayside Office Park14 Dargan Crescent, Belfast BT3 9
Chartered Energy Group

From: John Batch <john.batch@investni.com>
Date: Tue, 2 Feb 2016 11:34:13 +0000
To: Nigel McCormick <nigel.mccormick@sdsenergy.com>
Cc: Sustainable Development Tenders <susdevetenders@investni.com>
Subject: RE: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Hi Nigel

Calculations on Tier 2 still not right – check out the following logic and see if you agree.

Tier 1 RHI = Boiler Output for 1314 hrs = (suggest 199kw x 1314 hrs x Boiler Efficiency (suggest 85%) x Seasonal Efficiency (suggest 75%))
Tier 1 RHI payable – Boiler Output for 1314 hrs x 6.4p kWhr

Tier 2 RHI = (400,000 Annual RHI Cap – Tier 1 kWhr) x 1.5p kWhr

Remaining Load of 191,136 (Total Load 591,136-400,000 RHI Cap) will be oil fired boiler – could you include the cost of the oil fired remainder assuming cost of 6p/ kWhr

Can you take a second look at this as I know the Client are very particular and will go through logic of the calculations want to make sure it is accurate.

We are almost there – there has been difficulty in understanding these calculations from other consultant it's the way the DETI guidance is worded it is not absolutely clear. What I have outline above relating to RHI calculation has been the clarified previously with DETI.

Hope this helps

John

From: Nigel McCormick [mailto:nigel.mccormick@sdsenergy.com]
Sent: 01 February 2016 15:11
To: John Batch <john.batch@investni.com>
Cc: Sustainable Development Tenders <susdevetenders@investni.com>
Subject: Re: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Hi John

Please find attached Revised Report for Carella Laminate Systems Ltd. I have changed the figures to receive the remaining kWh out of the 400,000kWh at 1.5p per kWh.

I added an extra section to the Biomass to explain where the figures came from in accordance with the tariffs and the corresponding operating hours of the boiler.

I trust this is satisfactory.

Kind Regards,

Nigel McCormick BEng (Hons) MSc
Senior Energy Engineer

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From: John Batch <john.batch@investni.com>
Date: Mon, 1 Feb 2016 09:29:05 +0000
To: Nigel McCormick <nigel.mccormick@sdsenergy.com>
Subject: RE: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Hi Nigel

Apologies – it is as you say 6.4p for Tier 1 and the 6.2p, (I was replying from memory through my phone at the time)

The main problem was that there does not appear to be any Tier 2 RHI calculated at 1.5p for the remaining kWhr (after 1314 hrs at Tier 1 6.4p) annually up to the 400,000 kWhr annual cap on RHI.

Could you perhaps consider and add in Tier 2 RHI and adjust figures accordingly in report.

Other than this the report is good.

Regards

John

From: Nigel McCormick [mailto:nigel.mccormick@sdsenergy.com]
Sent: 01 February 2016 09:15
To: John Batch <john.batch@investni.com>
Subject: Re: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Hi John

We have used 6.4p per kWh as that is the current Tier 1 rate. Your colleague Jim Clarke had sent me a link for this last week so that's why we have it in as 6.4p and not the 6.2p as you have mentioned. If this is incorrect I will happily change this for you. The link is as below.

http://www.nidirect.gov.uk/index/information-and-services/environment-and-greener-living/energy-wise/energy-saving-grants/renewable-heat-incentive-rhi/rhi-for-non-domestic-customers.htm

I am out on site the rest of this morning doing another survey at Woodburn Engineering for a survey through yourselves, but should be back in later on this afternoon.

Kind Regards,

Nigel McCormick BEng (Hons) MSc
Senior Energy Engineer

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From: John Batch <john.batch@investni.com>
Date: Fri, 29 Jan 2016 16:46:25 +0000
To: Nigel McCormick <nigel.mccormick@sdsenergy.com>
Cc: Sustainable Development Tenders <susdevetenders@investni.com>
Subject: RE: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Hi Nigel

I have just taken a quick look at report and will fully appraise on Monday.

Can you please check the RHI calculations, I may be wrong at a glance and without checking fully.

You are correct in using 1314 hrs at Tier 1 rate of 6.2p and thereafter Tier 2 rate at 1.5p should be applied up to an annual maximum of 400,00o kWhr

In addition the output of biomass boiler over 1314 hrs should take account of boiler efficiency and seasonal variation.

Hope this helps clarify the recent changes in RHI and this might change the figures

1314 @ 6.2p then remainder @ 1.5p up to maxium cap.

Otherwise a great report and very clear.

I will talk on Monday

Regards

John

From: Nigel McCormick [mailto:nigel.mccormick@sdsenergy.com]
Sent: 29 January 2016 14:44
To: Sustainable Development Tenders <susdevetenders@investni.com>
Cc: Christine McCann <christine.mccann@sdsenergy.com>; Chris Maguire <chris.maguire@sdsenergy.com>
Subject: IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Dear Sir/Madam

Please find attached Report for Carella Laminate Systems – IMP885.

Kind Regards,

Nigel McCormick BEng (Hons) MSc
Senior Energy Engineer

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OPB-26044

Invest NI – Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Carella Laminate Systems Ltd.

January 2016

SDS Energy Ltd
part of
SDS Energy Group Ltd

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Prepared for:	Carella Laminate Systems Ltd.
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Telephone:	028 7181 0330
Email:	paddy@carella.com / seamusheron@carella.com
Date of issue:	28th January 2016
Project:	IMP 885 Biomass vs. Natural Gas Heating and Lighting Upgrade Assessment

Prepared by:	Nigel McCormick
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SDS Reference No:	SDS732/ IMP885

Contents

Executive Summary

SDS Energy was commissioned by Invest NI to complete an audit of Biomass Heating and Lighting Upgrade Assessments and the utilisation of a diesel generator during peak electricity times. Carella Laminate Systems Ltd. provides laminate-based products to the construction industry from their factory located just outside of Derry in Eglinton. The survey entailed a review of Carella Laminate Systems building. The electricity consumption for the site from December 2014 – November 2015 was 273,365 kWh at a charge of £22,347.08

The site electrical load is made up of the offices, a 350kW biomass boiler, buffer vessel, silo and auger system, processes that includes a number of motor-driven equipment. Lighting on the site is a range of fluorescent and metal halide that meets operational requirements.

The purpose of the survey was to assess the characteristics of the existing electricity supply and calculate the existing factory load and proposed factory load and plot these costs for grid electricity against using a new diesel generator with a 450kVA maximum capacity during Seasonal Time of Day (STOD). The assessment looked at the technical and economic viability of upgrading the existing Northern Ireland Electricity (NIE) owned site transformer to meet the load requirements for the entire site through a comparison of retaining the existing NIE transformer to installing a diesel generator to supply the existing and proposed factories. A maximum demand for the site was calculated using recorded data and also information provided by Carella for the proposed factory. Using the maximum demand figures, costs were compiled using NIE Statement of Charges and supply costs from the generator supplier.

The biomass heating system was investigated as to how much wood chip wastage is recycled on site and what this will increase to when the new factory is in operation. This gave an indication as to how much biomass fuel would need to be bought from a supplier through a fixed fuel contract, and also allowed us to calculate what the total load for the site would be. The RHI payment could then be calculated and a cost saving and payback period calculated. The report then assesses installing biomass against a natural gas baseline.

A review of the lighting installation and strategy was included, to determine the running and maintenance costs of the existing lighting against a suitable LED replacement.

Opportunities identified

The costs associated with upgrading the electrical supply to meet the proposed increase in maximum demand on the electrical supply are detailed in table 1.

Table 1 Comparison of NIE Tx upgrade vs. generator install

Description	Capital Costs	10 year Life Cycle Costs	Difference in 10 Year Life Cycle Costs
Upgrade of NIE Transformer	£48,147	£866,629	-
Install generator to supply extension	£49,813	£712,253	-£154,376

Although there is considerable savings over a ten-year period, it would be recommended that consideration be given to the stability to the price of crude oil over the same period that could have a major bearing on operating costs of a diesel generator.

Table 2 projects the savings that are possible through the upgrade of the lighting.

Table 2 Proposed LED Lighting Upgrade for Existing Factory

Proposal	Capital Costs	Payback period	Annual Cost Savings
Site lighting Upgrades	£36,405	6.51years	£5,5952.60

Table 3 Proposed LED Lighting Upgrade for Existing Factory & Proposed Factory Combined (Assuming existing fittings were in place in new factory and an LED Lighting Upgrade took place)

Proposal	Capital Costs	Payback period	Annual Cost Savings
Site lighting Upgrades	£85,586	6.24years	£13,706.85

If Carella Laminate Systems Ltd. were to consider proceeding with upgrades of the lighting systems, it would be recommended a design is completed to ensure the system is both efficient and will meet operational needs.

Table 4 details the difference in costs for biomass installation against oil and gas baselines.

Table 4 Biomass Costs

ID	Description	Capital Cost	Capital Cost – against baseline	Energy Savings (kWh)	Emissions Reduction (TCO2e)	Operational Expenditure Savings (£) (Inc. VAT)	Simple Payback (years)	Simple Payback – against baseline (years)
1	Biomass Boiler – against gas baseline	£109,200	£51,451	-	84.64	£30,127.10	1.71	3.62
2	Biomass Boiler – against oil baseline	£109,200	£60,705	-	74.00	£22,281.81	2.66	4.79

1.0 Introduction

SDS Energy has been commissioned by Invest Northern Ireland on behalf of Carella Laminate Systems Ltd. to complete an energy efficiency audit. The aim of the audit is to determine the most efficient and sustainable source of energy to run the existing factory and proposed factory.

There are proposed developments to extend the Carella Laminates Factory, which will see the installation of additional equipment. The proposed equipment will add to the electricity load and also required additional space heating plant.

This report compares projected capital investment and running costs of proposed energy sources to determine the most efficient and sustainable energy supply; electricity supplied from the grid or on site generation, and the best type of boiler plant to heat the space.

Disclaimer:

The information within this report has been produced using energy data provided or recorded during a site audit. The recorded data is based on activities at that time and should be taken in that manner. The figures stated within the report have been derived through verified methodologies and costing exercises, although they should still be treated as indicative. SDS Energy are not responsible for the performance of the factory or any proposed measures, as a result no guarantee or warrantee of factories energy performance in practice can be based on the recorded or calculated results alone.

2.0 Energy Analysis

The following section details the energy analysis for Carella Laminate Services Ltd.

2.2 Existing Energy Consumption

Monthly Energy Data has been sourced from the energy bills from the utility providers and an assumed calculation for the use of biomass as they recycle their own wood waste to use in their existing biomass boiler.

It has been established that a total of 754,103kWh of energy is consumed per annum. This is split between Electricity, Kerosene Oil, Gas Oil and Biomass that accounts for 36.30%, 9.99%, 2.68% and 51.03% respectively. It was established that the gas consumption was fully associated with the heating of the warehouse, whereas approximately one twelfth of the electricity is associated with the offices.

Table 5 Existing Energy consumption

	Energy (kWh)	Percentage
Electricity	273,765	36.30%
Kerosene Oil	75,332	9.99%
Gas Oil	20,205	2.68%
Biomass (Wood Chip)	384,800	51.03%
Total	***754,103***	

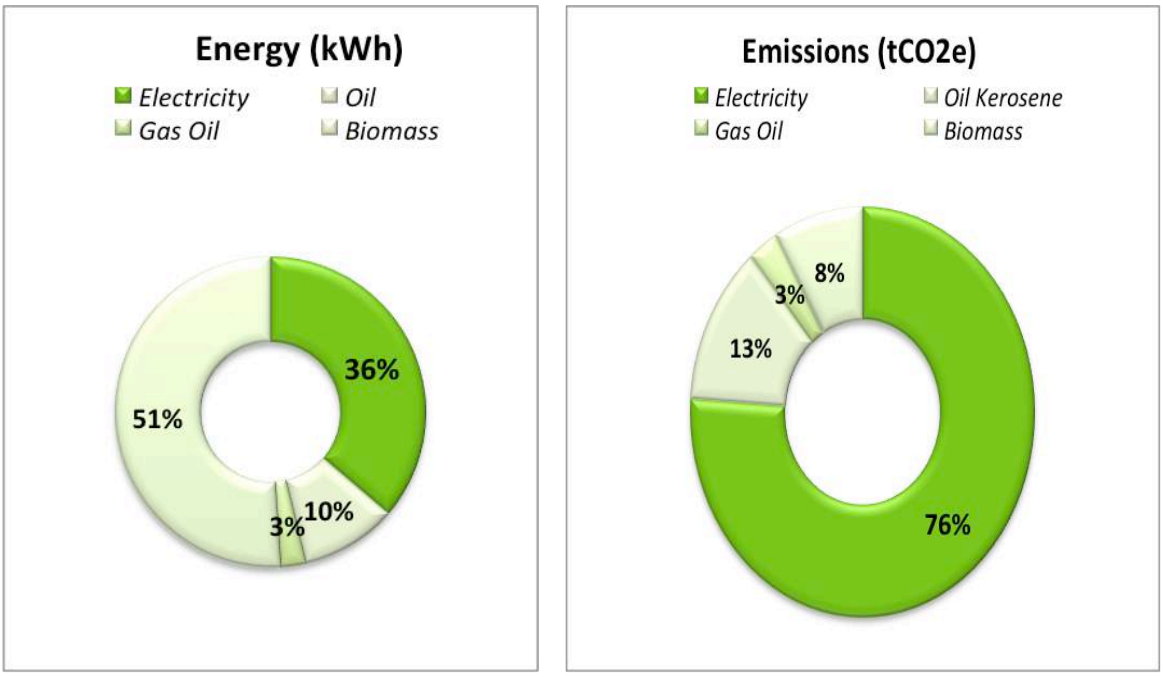
The energy consumed equates to a total of 177.92TCO2e per annum. When split between electricity, kerosene oil, gas oil and biomass with the emission split is 76.06%, 12.67%, 5.08% and 14.99% respectively.

Table 6 Existing Emissions

	Emissions (TCO2e)	Percentage
Electricity	135.32	76.06%
Kerosene Oil	22.54	12.67%
Gas Oil	5.08	2.85%
Biomass (Wood Chip)	14.99	8.42%
Total	***177.92***	

Ref: CIBSE Guide F

Figure 1Carella Laminate System's Energy & Emissions Split



2.2 Energy Benchmarking

Good Practice Energy Benchmarks have been sourced from CIBSE Guide F. These detail the typical energy consumption associated with an energy efficient factory office and warehouse building, in term of energy consumed per m^2.

The first table below details that an energy efficient warehouse would consume 100kWh/m2 per annum. It has been calculated that Carella's warehouse consumes 143.20kWh/m2 per annum. As a result it has been calculated that the company warehouse consumes 43.20% more energy per annum in relation to a good practice building.

The second table below details that an energy efficient factory office would consume 225kWh/m2 per annum. It has been calculated that Carella's offices consume 143.2kWh/m2 per annum. As a result it has been calculated that the company's offices consume 36.36% less energy per annum in relation to a good practice building.

Table 7 Energy Benchmark Comparisons

	Benchmark	Actual	Difference
Thermal (kWh/m2) Warehouse	80	89.78	12.23%
Electricity (kWh/m2) Warehouse	20	53.42	167.09%
Total (kWh/m2)	***100***	***143.20***	***43.20%***

Ref: CIBSE Guide F

	Benchmark	Actual	Difference
Thermal (kWH/m2) Factory offices	97	89.78	-7.44
Electricity (kWh/m2) Factory Offices	128	53.42	-58.27%
Total (kWh/m2)	***55***	***15.58***	***-36.36%***

Ref: CIBSE Guide F

Figure 2 Energy Benchmark Comparisons

In relation to emissions the good practice benchmark figures have been converted. From this it has been calculated that the Carella's warehouse emits 21.13% more emissions per annum in relation to a good practice warehouse. Offices emit 54.62% less emission than a good practice warehouse offices.

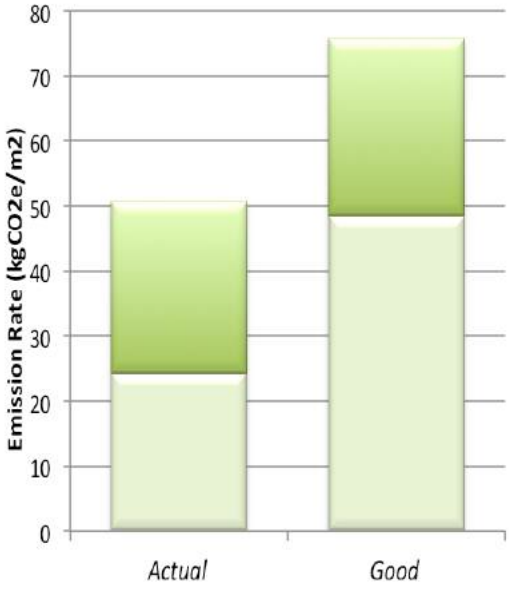
Table 8 Emissions Benchmark Comparisons

	Benchmark	Actual	Difference
Thermal (kgCO2e/m2) Warehouse	14.80	3.50	-76.37%
Electricity (kgCO2e/m2) Warehouse	9.89	26.40	-167.09%
Total (kgCO2e/m2)	***24.68***	***29.90***	***21.13%***

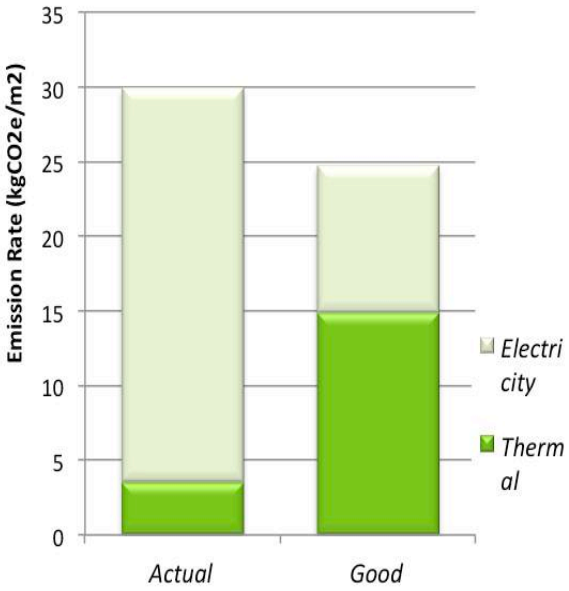
	Benchmark	Actual	Difference
Thermal (kgCO2e/m2) Factory Offices	48.50	24.31	-49.87%
Electricity (kgCO2e/m2) Factory Offices	27.18	26.40	-2.86%
Total (kgCO2e/m2)	***75.68***	***50.72***	***-32.99%***

Figure 3 Emissions Benchmark Comparisons

Factory Office



Factory Warehouse

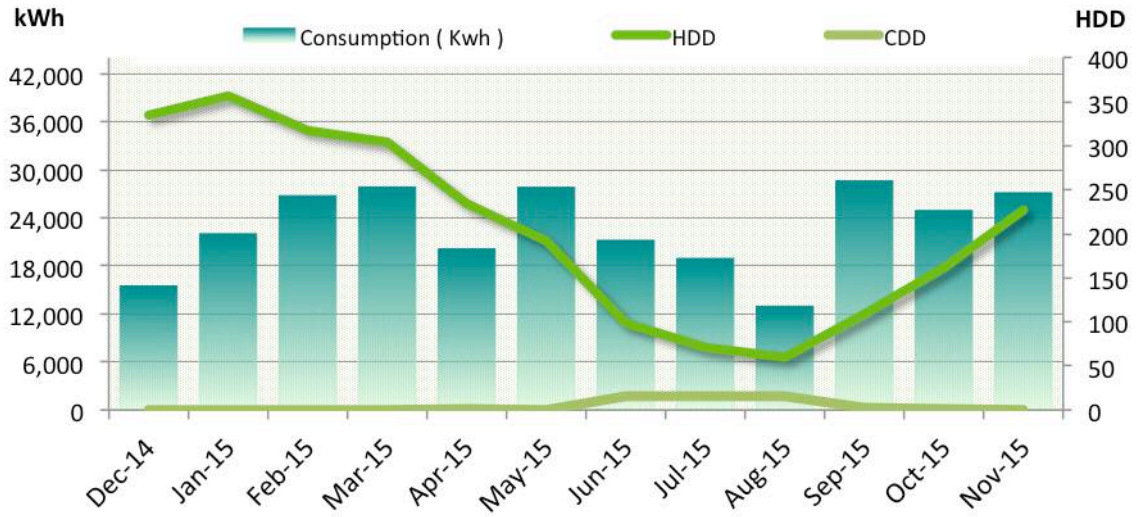


2.2 Energy Profile & Split

The electricity consumption has been plotted over a period of 12 months.

It can be seen from the analysis of the energy consumption that there is a seasonal profile. This could be due to the fact that the electricity is the only source of energy for the heating and the cooling of the offices area. There is a significant relationship between both the Heating/Cooling Degree Days and the electricity consumption, thus indicating that the external conditions have an energy impact upon the electricity consumption.

Figure 4 Annual Electricity Consumption Profile



Annual Min:	12,956 kWh	August	- 43.21% of Average
Annual Max:	28,611 kWh	September	+ 25.41% of Average
Annual Avg:	22,814 kWh		

The electricity consumption of the offices has been split using a typical office energy breakdown, as shown in CISBE Guide F.

Office Electricity Use	Breakdown (%)	Energy (kWh)
Lighting	60%	4,808
Office equipment	12%	962
Fans, pumps and controls Humidification	18%	1,442
Other electricity	7%	561
Catering electricity	3%	240

Ref: CIBSE Guide F

The electricity consumption of the warehouse has been split using a typical warehouse energy breakdown, as shown in CISBE Guide F.

Warehouse Electricity Use	Breakdown (%)	Energy (kWh)
Lighting	58%	154,507
Office equipment	21%	55,623
Fans, pumps and controls Humidification	12%	30,901
Other electricity	5%	12,361

Ref: CIBSE Guide F