BIOMASS BOILER INSTALLATION AND DISTRICT HEATING UPGRADE

PRESENTATION FOR

THE IRBEA NATIONAL BIOENERGY CONFERENCE

21 FEBRUARY 2013

Údarás na Gaeltachta Ard Oifig
Na Forbacha
Gaillimh

RASLRES
Regional Approaches to Stimulating Local Renewable Energy Solutions

WDC
WESTERN DEVELOPMENT COMMISSION
COIMISIÚN FORBARTHA AN IARTHAIR

seai
SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Údarás na Gaeltachta

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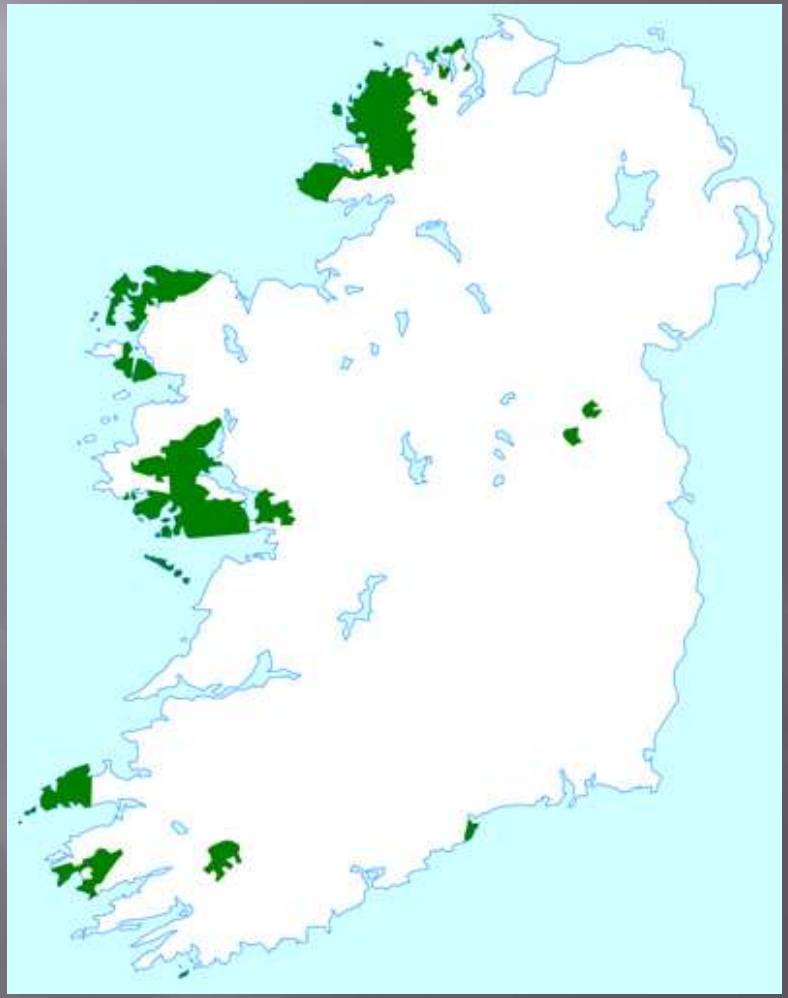
Údarás na Gaeltachta

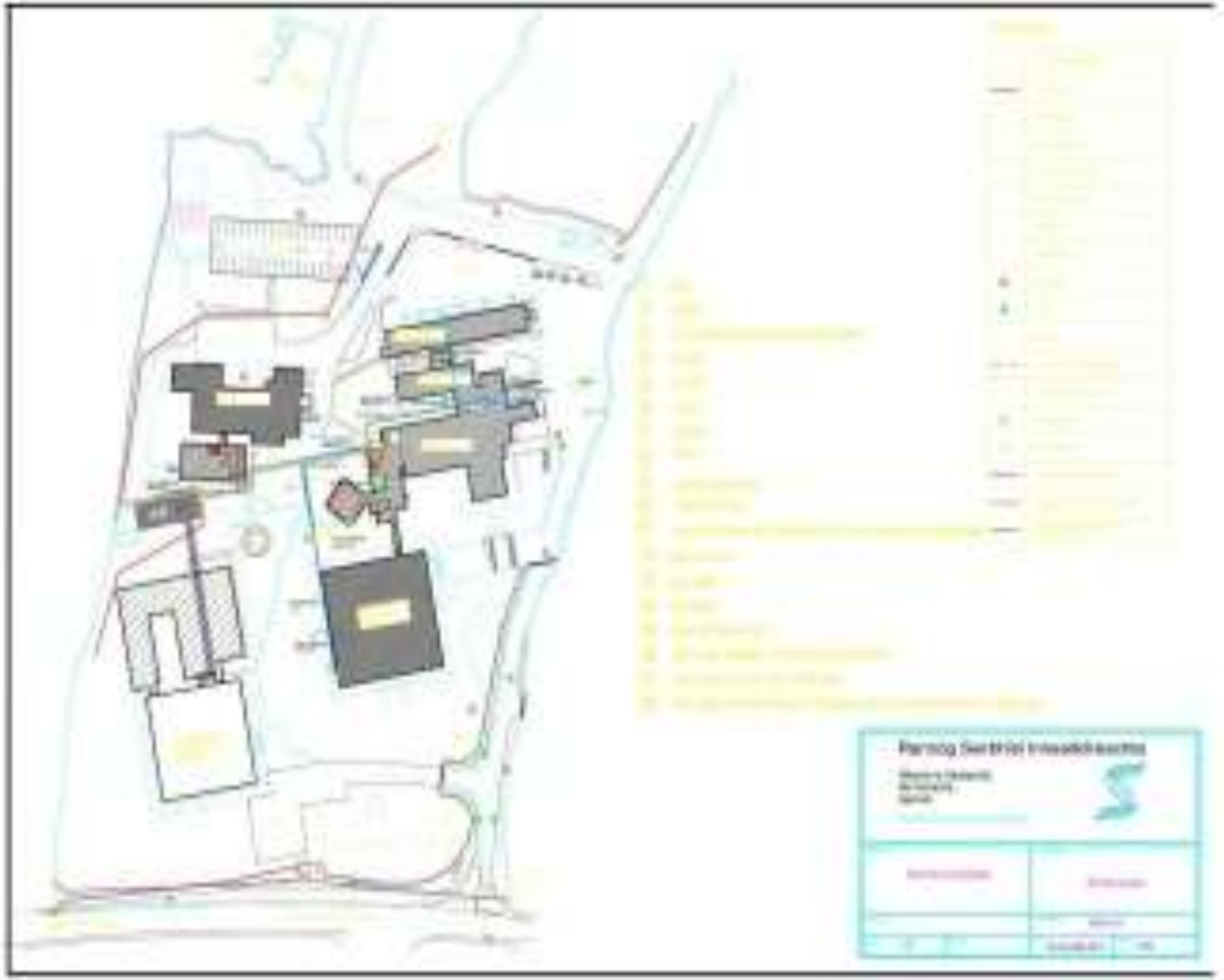
- Established in 1980
- Regional Authority responsible Economic, Social and Cultural Development
- Governing Board of 12 and 82 Staff Members
- Over 7000 people employed in Údarás na Gaeltachta Client Companies

Údarás na Gaeltachta



Why Upgrade

1. Old Boiler
2. Problems with leaks on district heating
3. Government Directive to reduce Energy Use by 33% in Public Buildings by 2020
4. Need to reduce our energy imports
5. Help to create an awareness for the development of local indigenous renewable fuel
6. Help to promote local business and jobs.



Údarás na Gaeltachta

Údarás na Gaeltachta

GERARD D'Arcy

Údarás na Gaeeltachta

Údarás na Gaeltachta

GERARD D'Arcy

Data

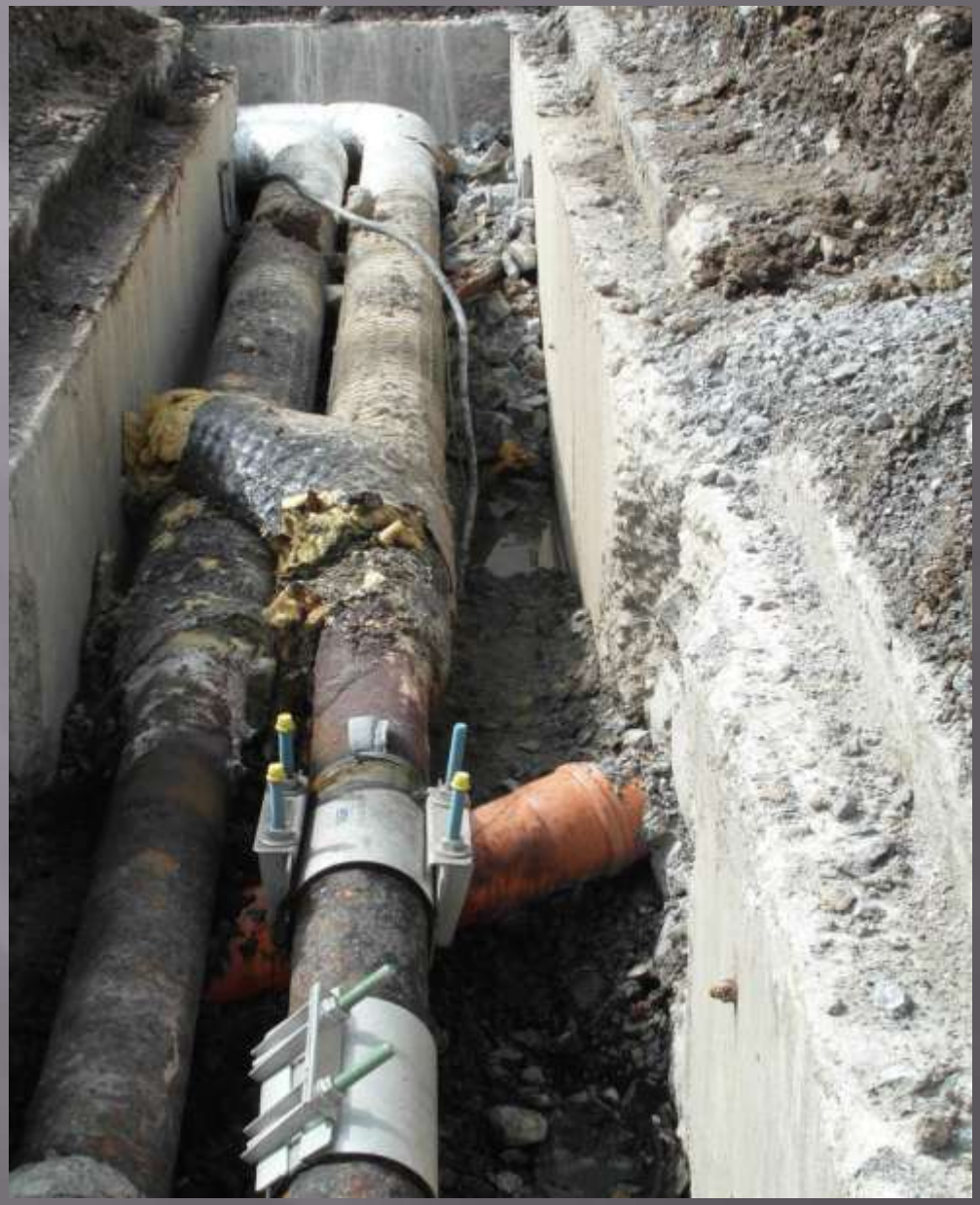
- Data on Existing Installation:

1. Engineering Block , G-Comm Building and Stores built in the early 1970's
2. Main Building completed in 1980
3. The New Board Room and Business Unit completed in 2002
4. 700 kW oil fired Britannica boiler and GB District Heating Piping in-situ for over 34 years
5. Maximum Heat Load is 590 kW
6. Total Floor Area is 3,060 m sq.

Old 700kW boiler

Old 700kW boiler

District Heating



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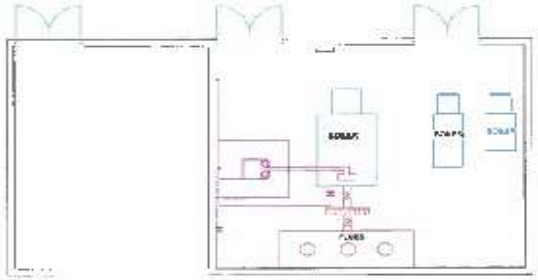
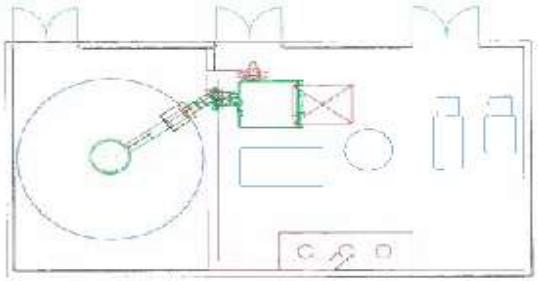
District Heating

District Heating

First Proposal



EXISTING LAYOUT



PROPOSED LAYOUT

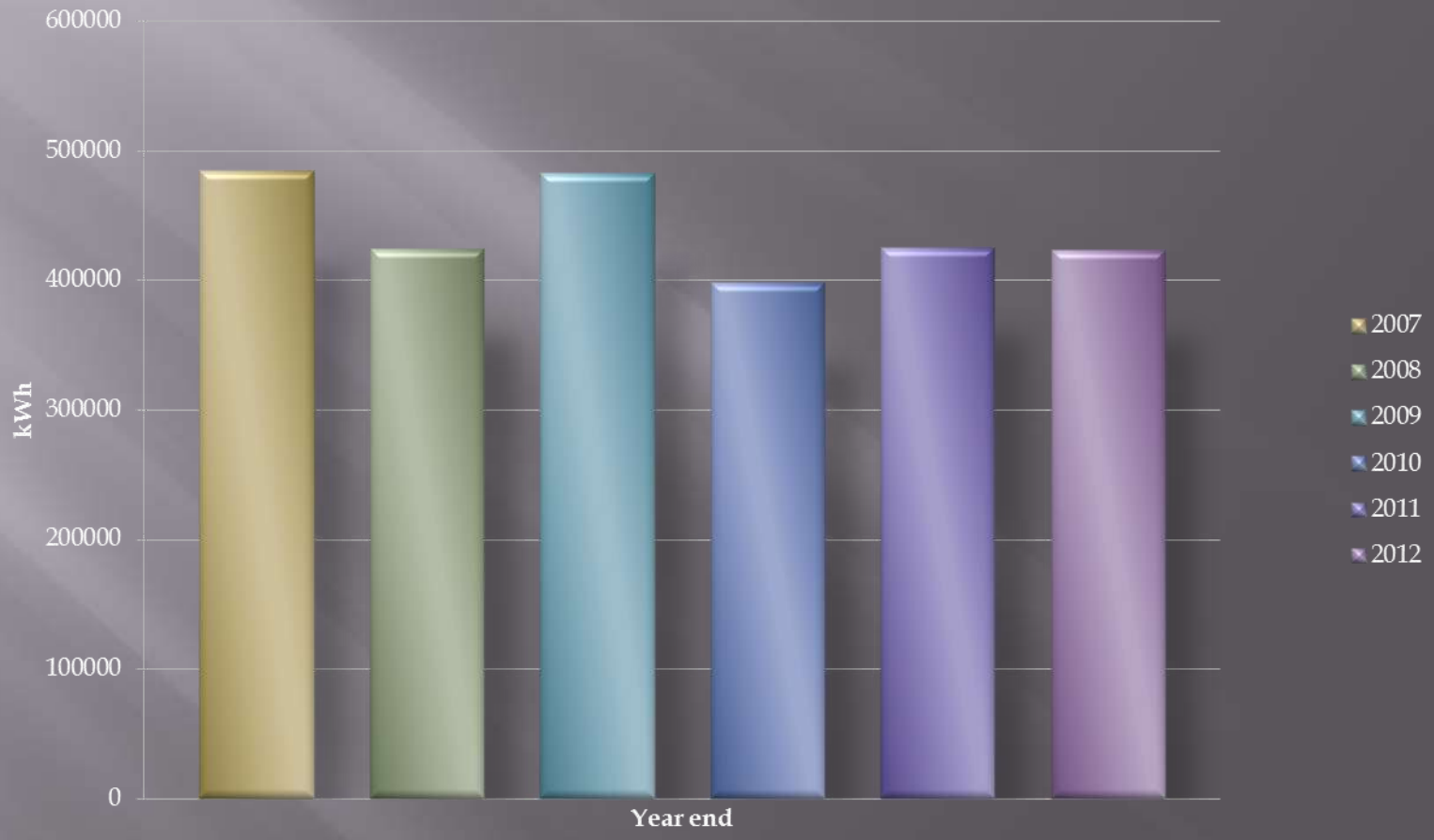
EU Procurement Guidelines

- Notice on the official EU Journal on the Competitive Dialogue
- Return by Contractors with an Expression of Interest
- Contractors invited to visit the site and prepare a proposal
- A list of contractors was prepared

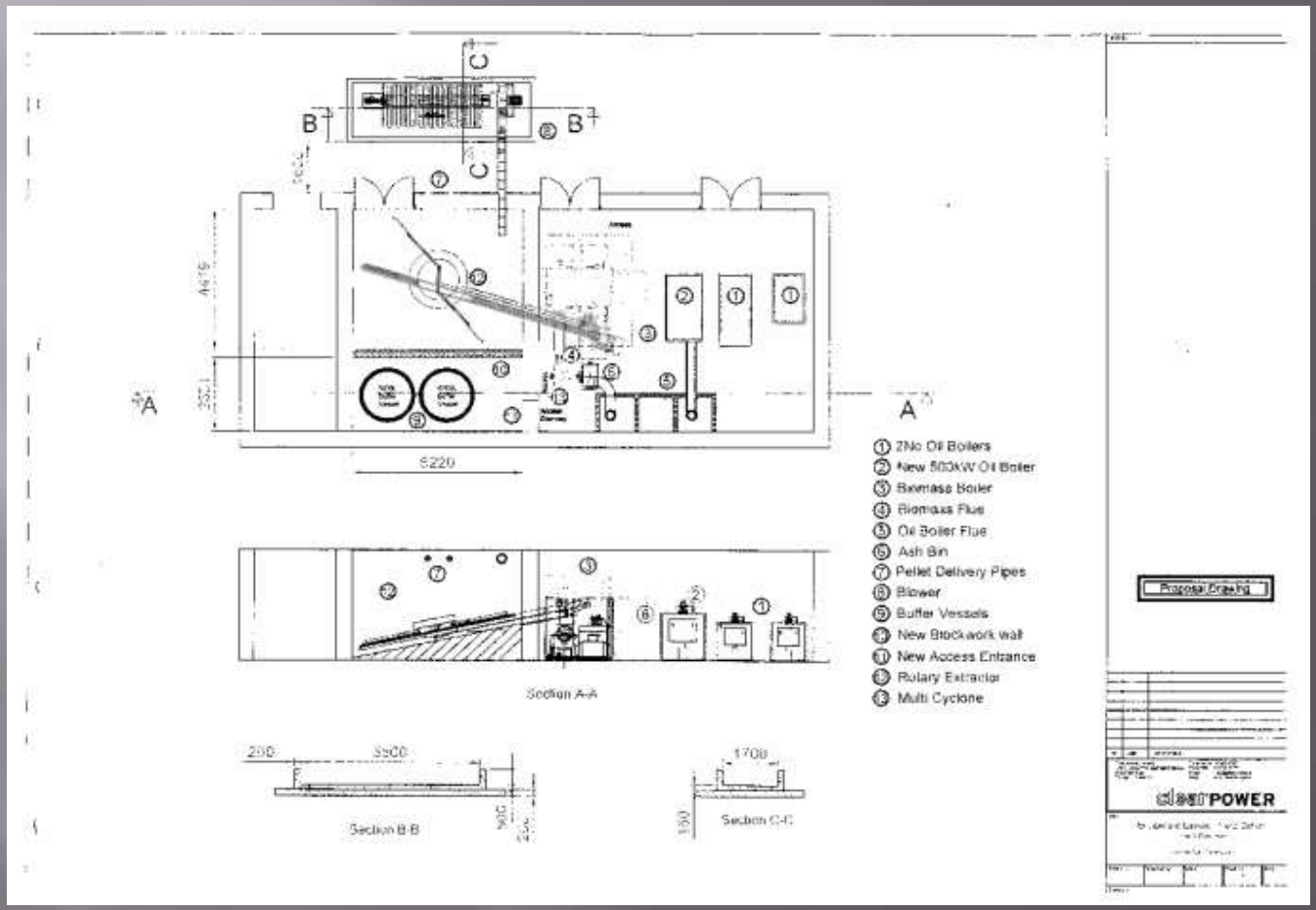
Design Considerations

- Boiler size and back-up system
- Location of buffer tanks
- Location and size of wood chip store
- Location of wood chip hopper and feed system
- Access for fuel delivery truck
- District Heating piping, factory insulated plastic pipe or rigid GB.
- System of heating control

Heat Energy Consumption



Design Considerations



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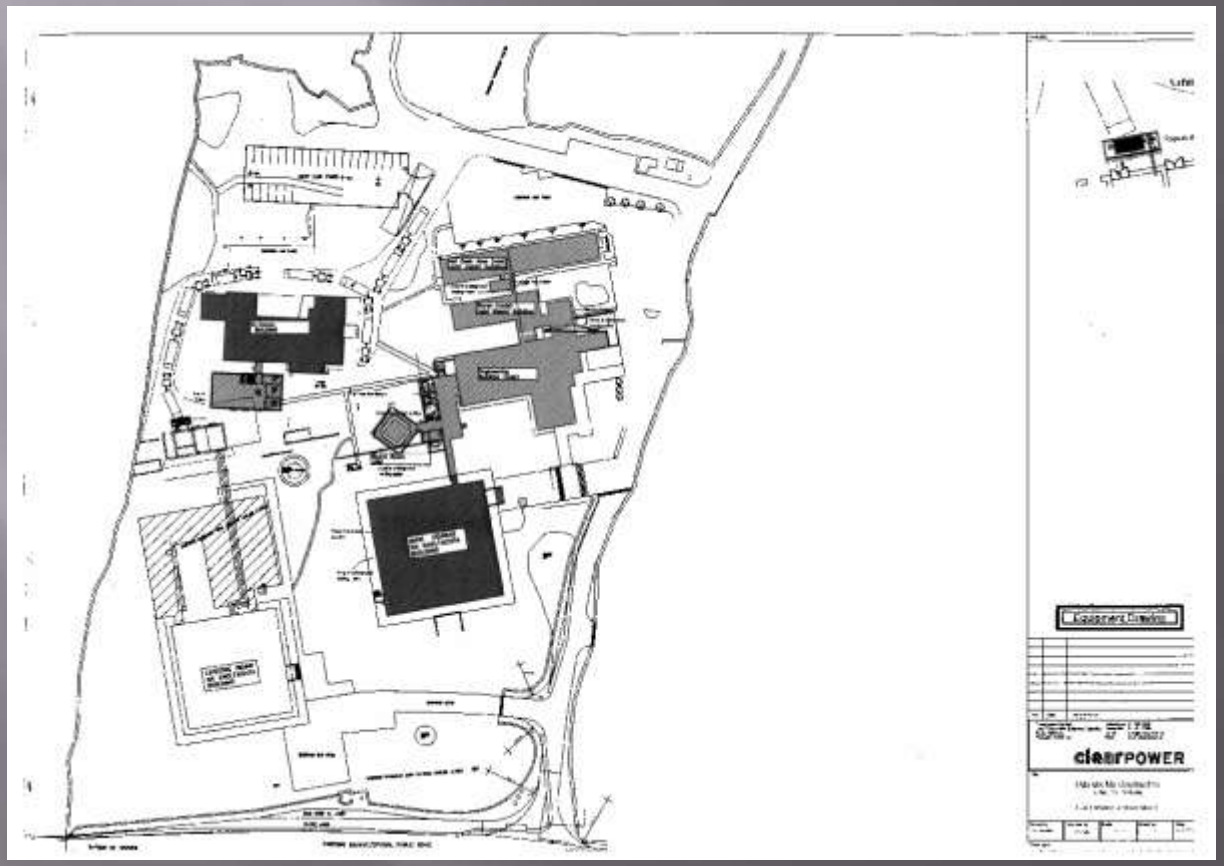

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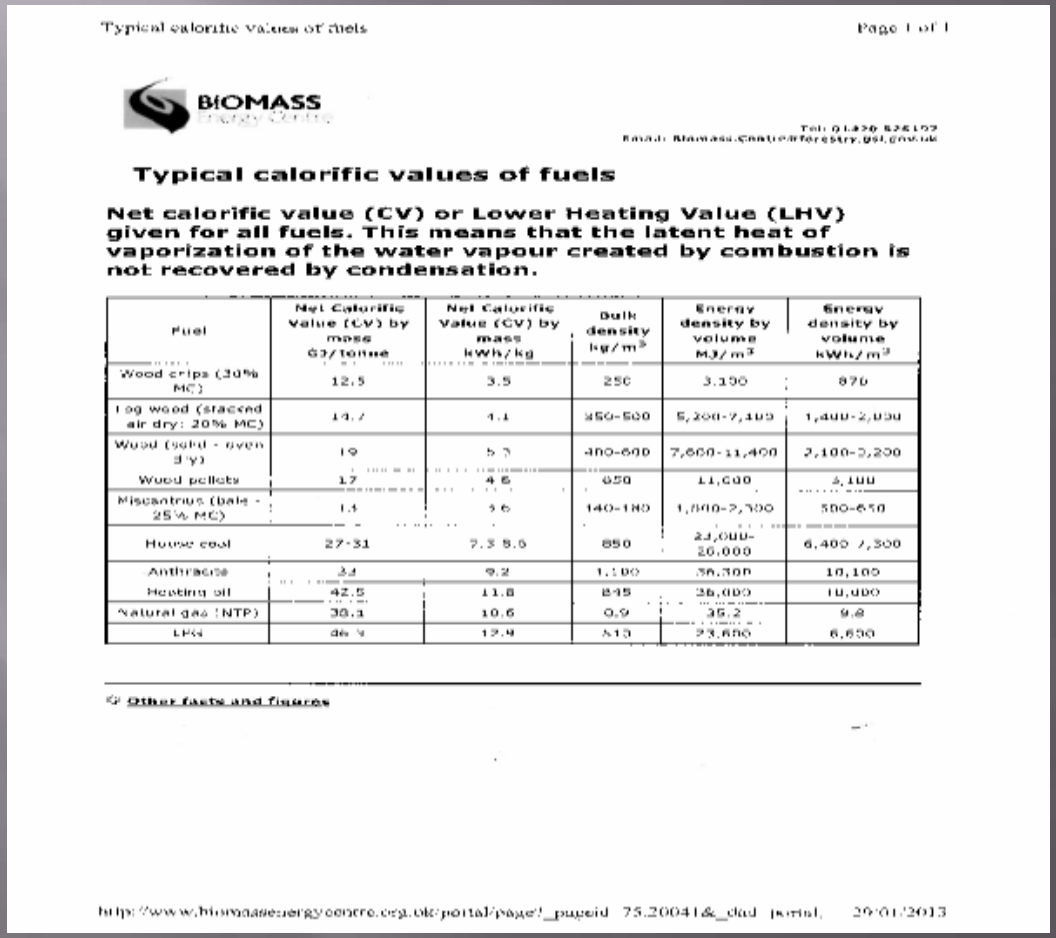

Typical calorific values of fuels Page 1 of 1

BIOMASS Energy Centre

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Typical calorific values of fuels

Net calorific value (CV) or Lower Heating Value (LHV) given for all fuels. This means that the latent heat of vaporization of the water vapour created by combustion is not recovered by condensation.

Fuel	Net Calorific Value (CV) by mass GJ/tonne	Net Calorific Value (CV) by mass kWh/kg	Bulk density kg/m³	Energy density by volume MJ/m³	Energy density by volume kWh/m³
Wood chips (30% MC)	12.5	3.5	250	3,150	870
Log wood (stacked air dry: 20% MC)	14.7	4.1	350-500	5,200-7,100	1,400-2,000
Wood (solid - oven dry)	19	5.3	400-600	7,600-11,400	2,100-3,200
Wood pellets	17	4.8	650	11,000	3,100
Miscanthus (bale - 25% MC)	14	3.9	140-180	1,800-2,700	500-650
House coal	27-31	7.5-8.5	850	23,000-26,000	6,400-7,300
Anthracite	33	9.2	1,100	36,300	10,100
Heating oil	42.5	11.8	845	36,000	10,000
Natural gas (NTP)	38.1	10.6	0.9	35.2	9.8
LPG	46.4	12.9	513	23,800	6,650

Other facts and figures

http://www.biomassenergycentre.org.uk/portal/page!_pageid=75,20041&_dad=portal... 29/01/2013

Design Considerations

- Typical Calorific Value of Wood Chip (NCV) at 30% MC
  - NCV by mass kWh/kg = 3.5
  - Bulk Density kg/m3 = 250, (4.0m3 will store 1000kg)
  - Storage Area Available 5*5*2 = 50 m3 or 12.5 tonne of wood chip

ESCO Contract

- Concerns

1. Length of Contract (Capital cost + heat supply or heat supply only)
2. Minimum energy take
3. Heat supply measurement
4. Operation and Maintenance
5. Payment procedures
6. Biomass fuel supply
7. Delivery of fuel
8. Penalties for non delivery of heat

Steve Luker WDC

Grant Application

- Western Development Commission :
  - €20,000.00 grant approved (RASLRES EU Programme)
  - Developed a model ESCO Contract
  - Help in the preparation of a Works Contract for the Biomass Boiler Installation

SEAI

- 35% of the Value of the Capital Works (Better Energy Workplace 2012)

Steve Luker

Fred Tottenham

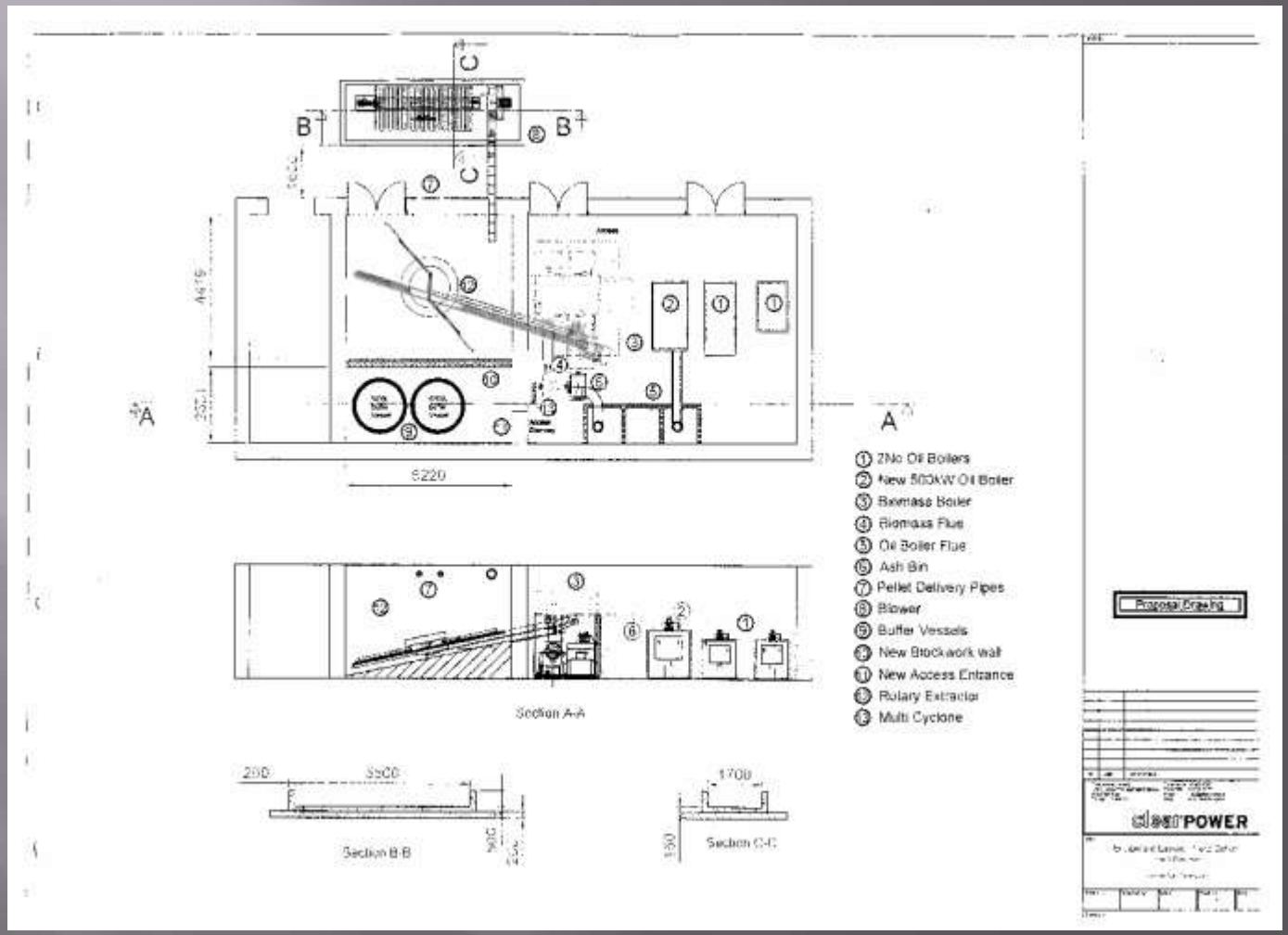
Tender Process

- Two Contracts
- Biomass Boiler Capital Works & ESCO Contract
- District Heating up-grade and installation of a wet heating system in two buildings.

Contract

- Award of Contract
- Agree Completion Dates
- Appoint Specialists
- Grant Draw-down Dates

Agreed Boiler House Layout



New Biomass Boiler

New Biomass Boiler

Oil Fired back-up boiler

Ash from Biomass Boiler

Fuel Delivery

Fuel Delivery

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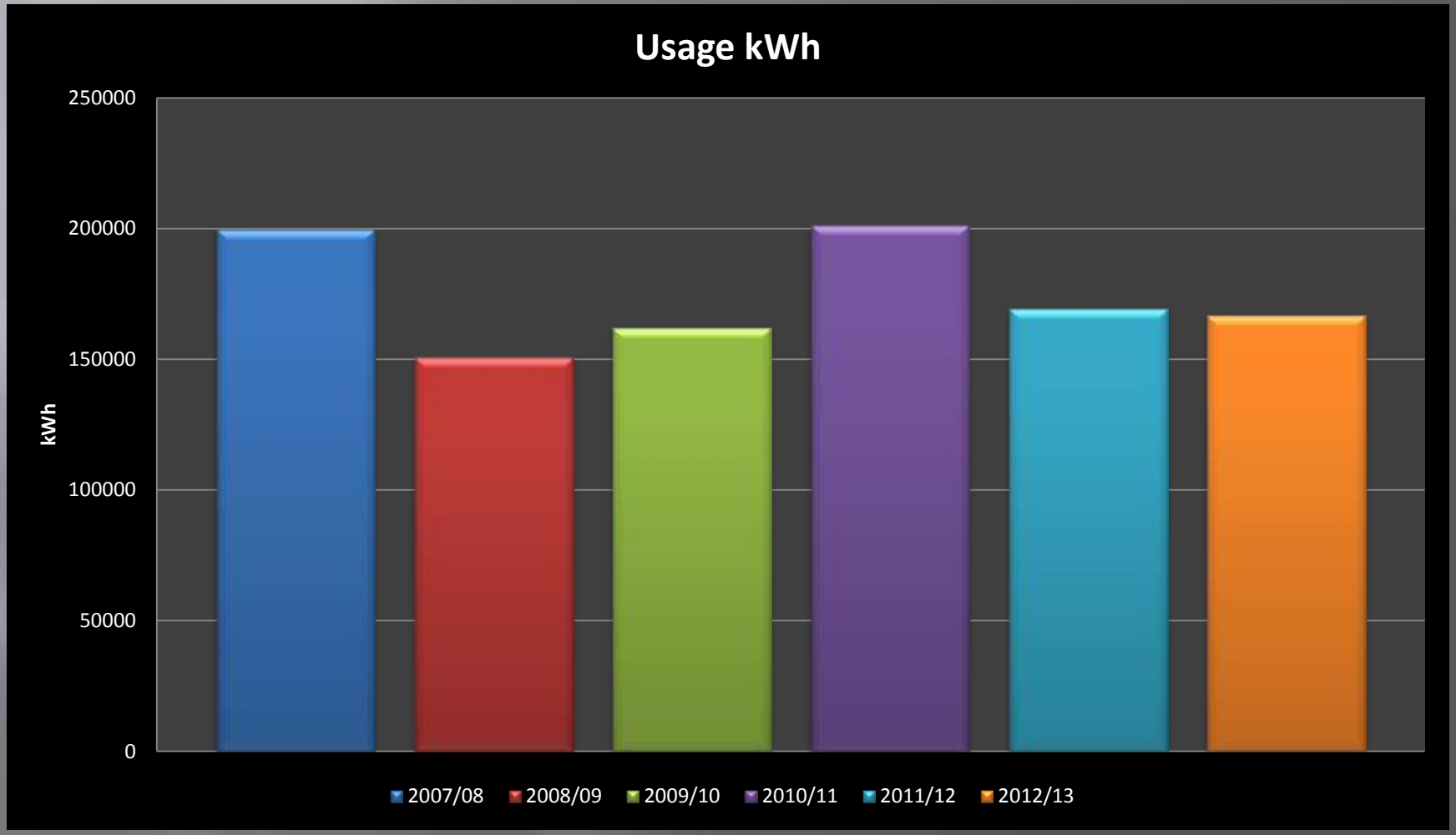
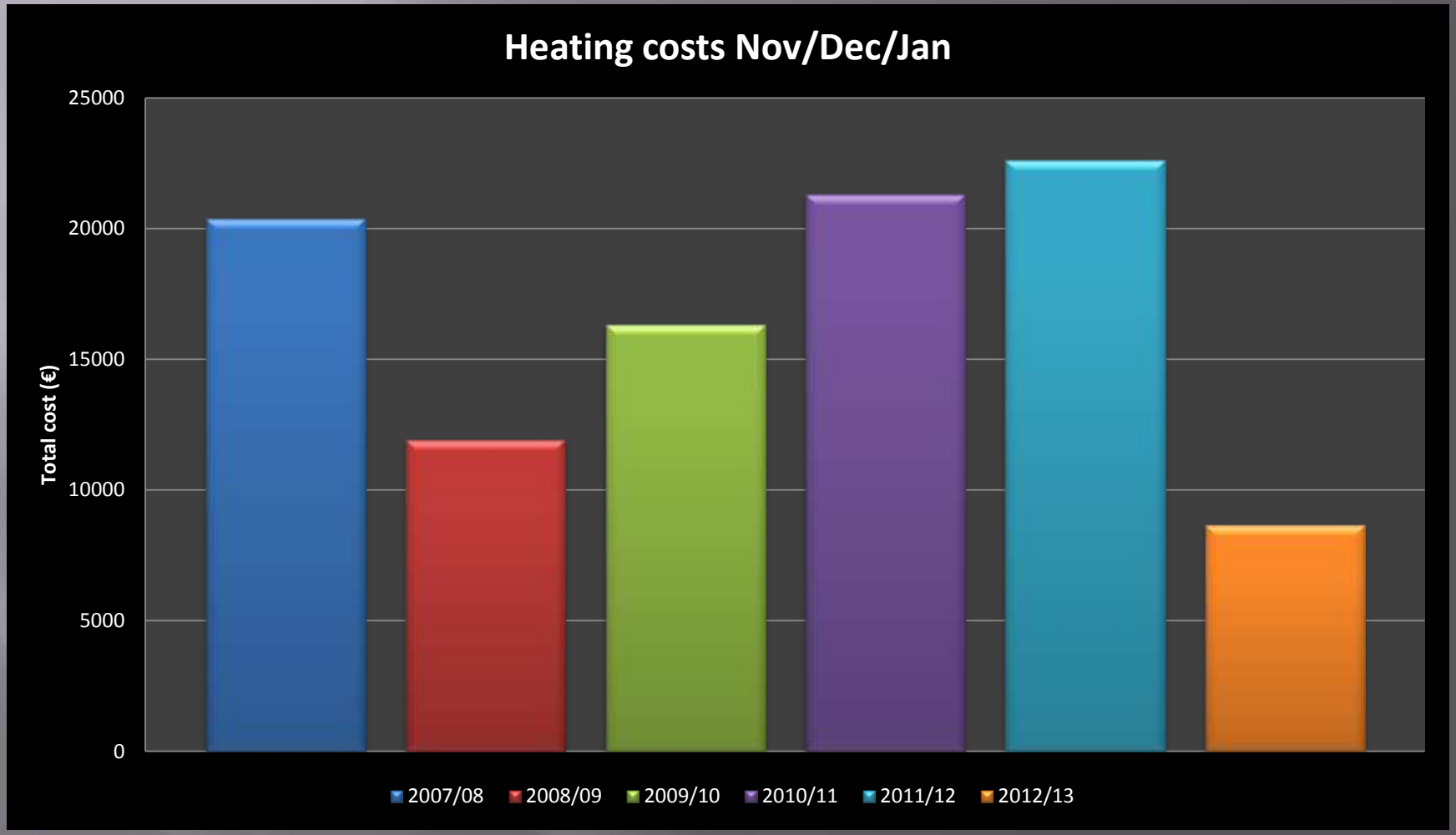
Fuel Delivery

Energy Usage and Costs



Energy Usage & Costs



Summary

- New 300kW high efficiency biomass boiler replacing a 700kW oil fired unit
- Reduced peak load on the system
- More efficient district heat distribution
- Lower running cost
- With grants a pay-back will be achieved in 3.5 years
- Overall the response from staff members on the new heating system has been positive

Summary

- Lessons Learned
  - Back-up system essential
  - Zone heating areas to reduce peak loading and improve efficiency
  - Put procedures in place during times of fuel delivery
  - Ensure the flow temperature from the back-up boiler is not set too low.
  - Plastic cover over the external heating ducts will protect the pipes and brackets from rusting

Final Word

- Thanks