ELECTROGLASS

The Specialists in Electric Glass Melting and Conditioning

1976-2023

47 Years Specialist Engineering to the Glass Industry

14th AIGMF International Conference on:
"Decarbonization for the Sustainable Glass Industry”
(Sept 15, 2023)

ENERGY EFFICIENCY :
A MAJOR FACTOR IN A CARBON NEUTRAL FUTURE.

Grahame Stuart
Project Sales Engineer

Energy efficiency is called the “first fuel” in clean energy transitions, as it provides some of the quickest and most cost-effective CO_2 mitigation options while lowering energy bills and strengthening energy security.

Energy efficiency is the single largest measure to avoid energy demand in the “Net Zero Emissions by 2050 Scenario”, along with the closely related measures of electrification, behavioural change, digitalisation and material efficiency.

SOURCE

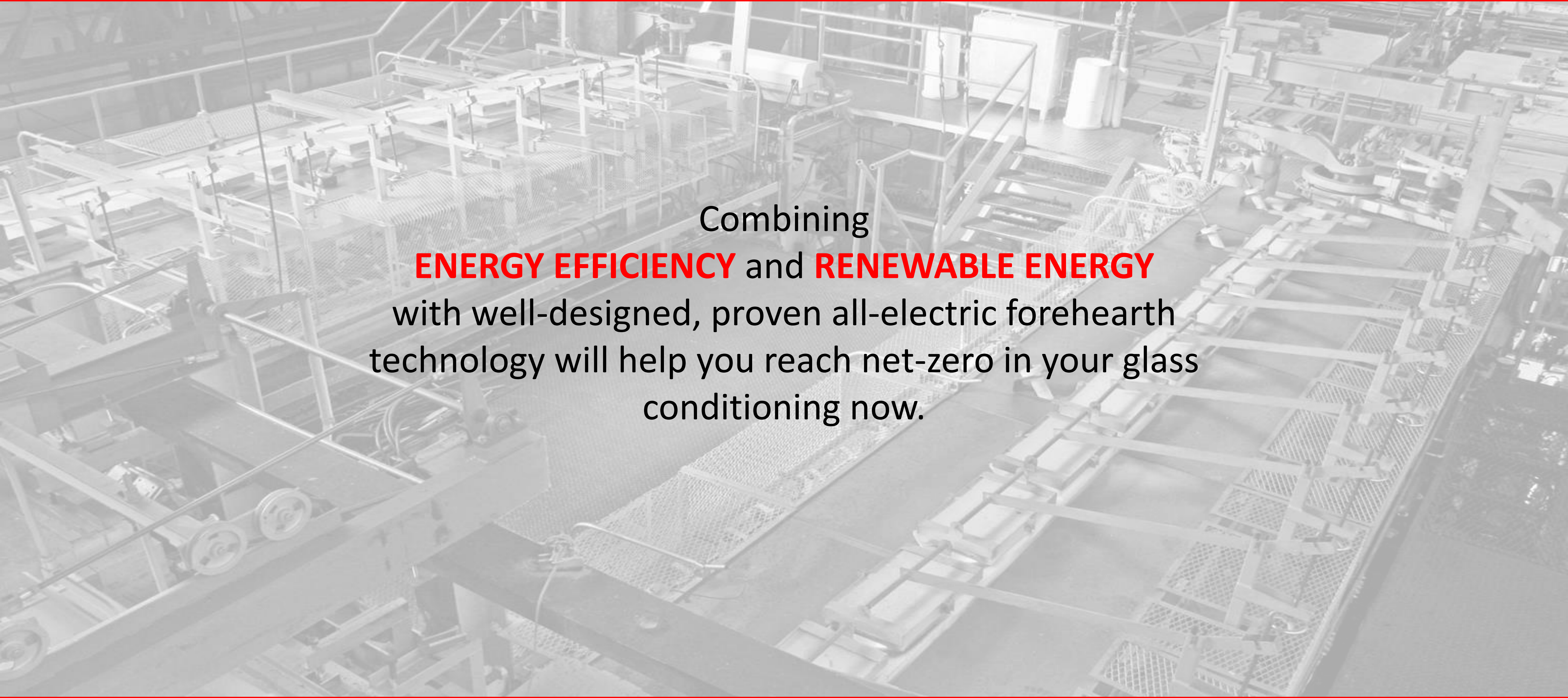
International Energy Agency – Tracking Energy Efficiency 2023

According to the International Energy Agency

Energy efficiency will contribute 37% of what is required to reach Net Zero Emissions by 2050.

Renewable energy will contribute 32% of what is required to reach Net Zero Emissions by 2050.

SOURCE
International Energy Agency – Tracking Energy Efficiency 2023



Combining
ENERGY EFFICIENCY and **RENEWABLE ENERGY**
with well-designed, proven all-electric forehearth technology will help you reach net-zero in your glass conditioning now.

- All-electric distributor & forehearth technology is not new
- Considered by many as suitable for volatile glasses
- Long proven for container glass conditioning
- Typically, 85-90% more energy efficient than gas heated systems
- Offering energy cost savings of up to 90%.

Operational Comparison - Gas Heated vs Electroflex All-Electric Forehearths

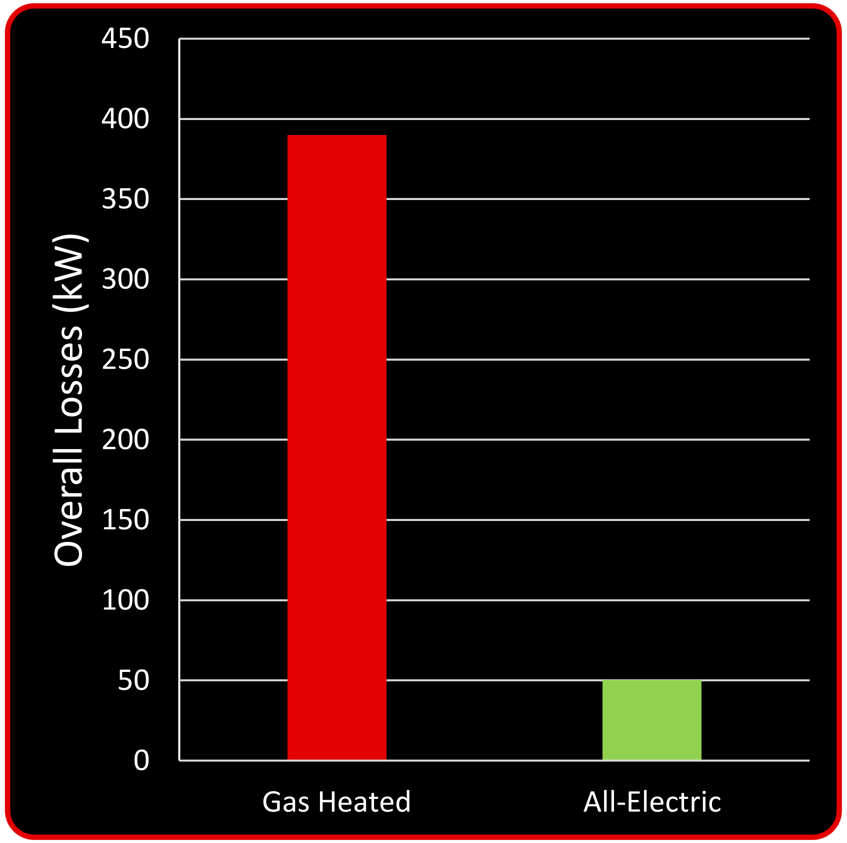
Pull - 50 tonnes/day

Temperature Drop - 90°C

Heat Loss From Glass – 80 kW

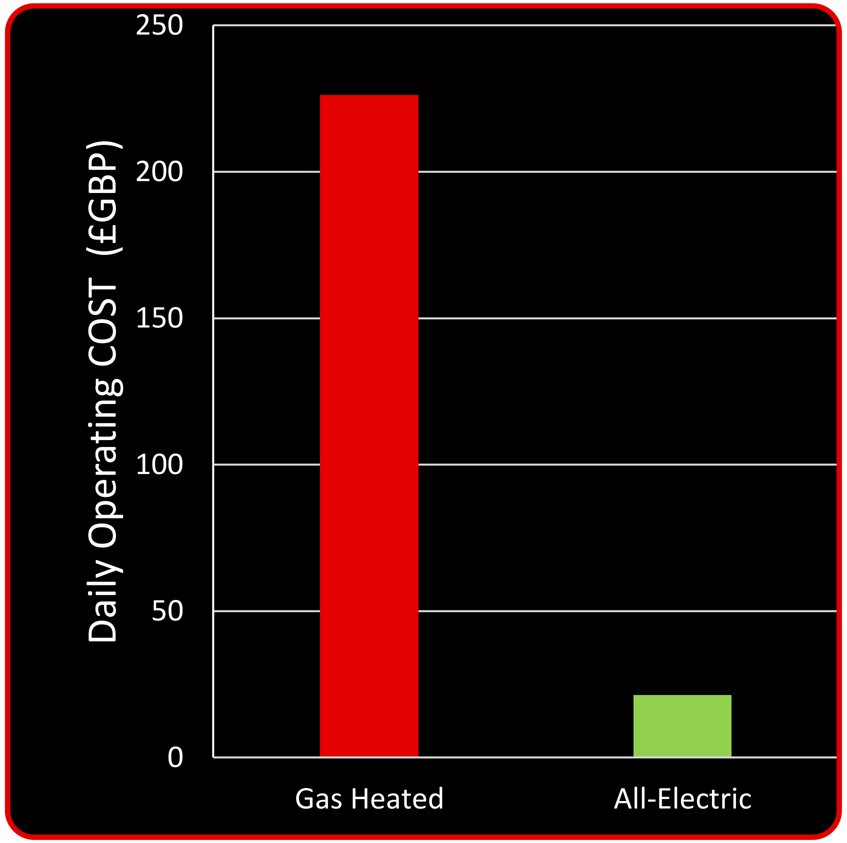
Gas Heated Forehearth		All-Electric Forehearth
775 m^3/day *@8350kCal/m^3*	Energy Consumption	**12** kW/day
7524 kWh/day* **based on 860kCal/kWh*	Energy Consumption in kWh	**288** kWh/day
390 kW	Total Structural Losses	**50 kW**

Operational Comparison - Gas Heated v. Electroflex All-Electric



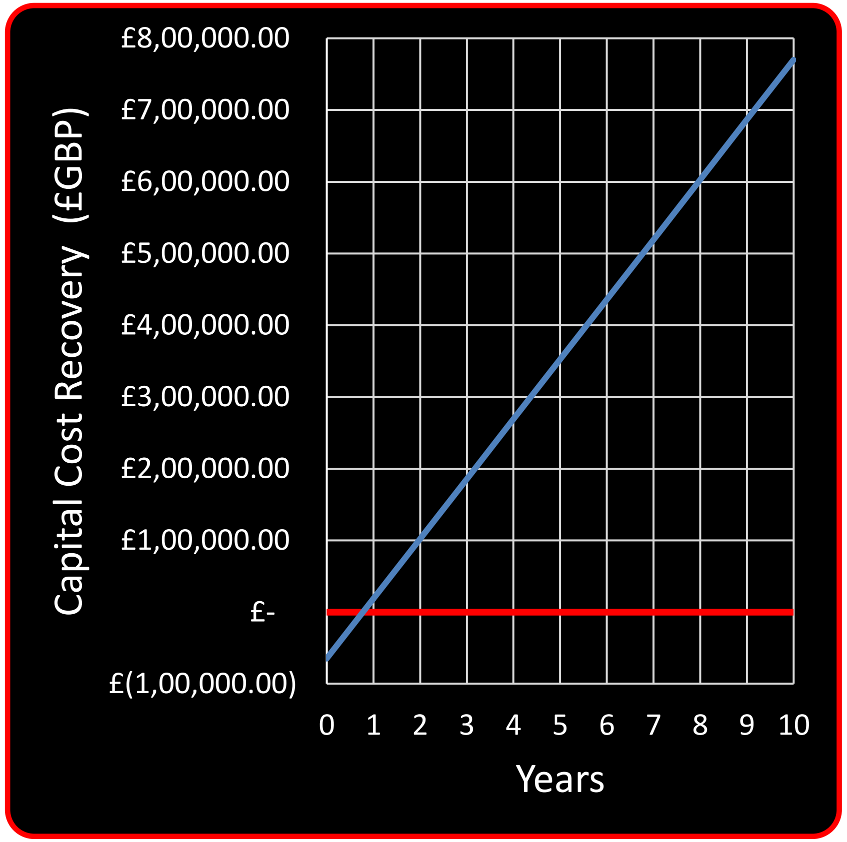
- **87% Reduction** in overall losses

Operational Comparison - Gas Heated v. Electroflex All-Electric



- **87% Reduction** in overall losses
- **90% Reduction** in operating COST

Operational Comparison - Gas Heated v. Electroflex All-Electric



- **87% Reduction** in overall losses
- **90% Reduction** in operating COST
- **£744,600.00 Saving** over a 10-year campaign
- **Zero** reliance on fossil fuels and **Zero** emissions at site

Understanding All-electric Forehearth Design Concept Differences

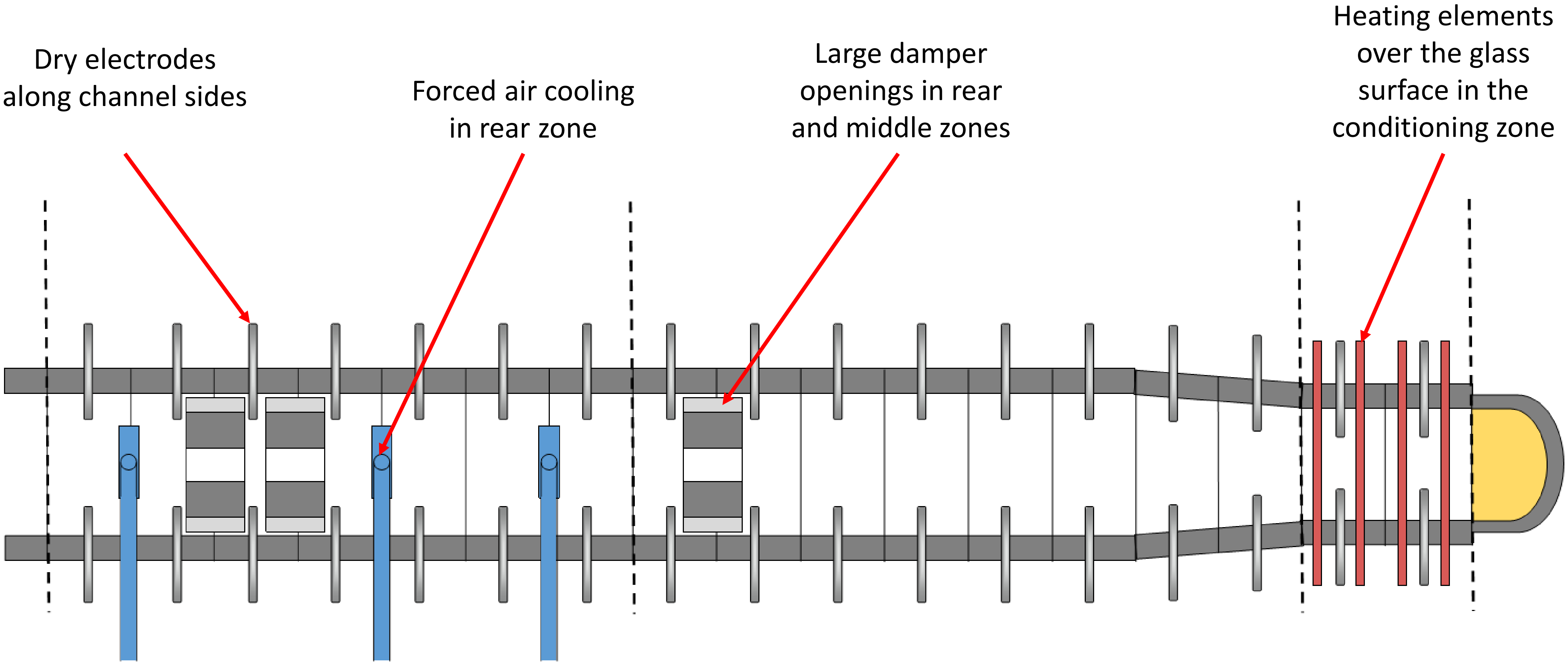
- Gas heated designs heavily modified to operate with heating elements, dry electrodes or a combination of both.

- Designs specifically developed for all-electric operation.

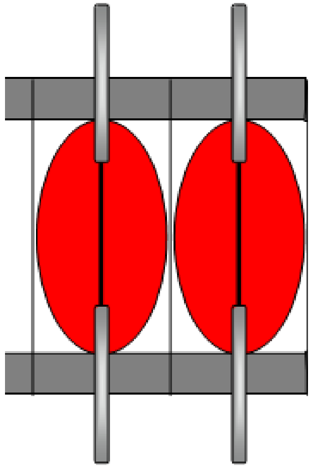
Modified Gas Heated Designs

- Burner systems for stand-by/emergency use.
- Superstructure refractory and insulation packages better suited to evacuating waste gases than promoting efficient operation.
- Few large damper openings.
- Forced air cooling systems.
- Heated by dry electrodes or a mixture of dry electrodes and radiant heating elements.

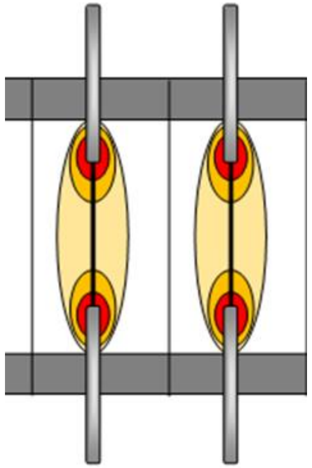
Modified Gas Heated Design Using Dry Electrodes



The Risk of Glass Reboil – Understanding Energy Release

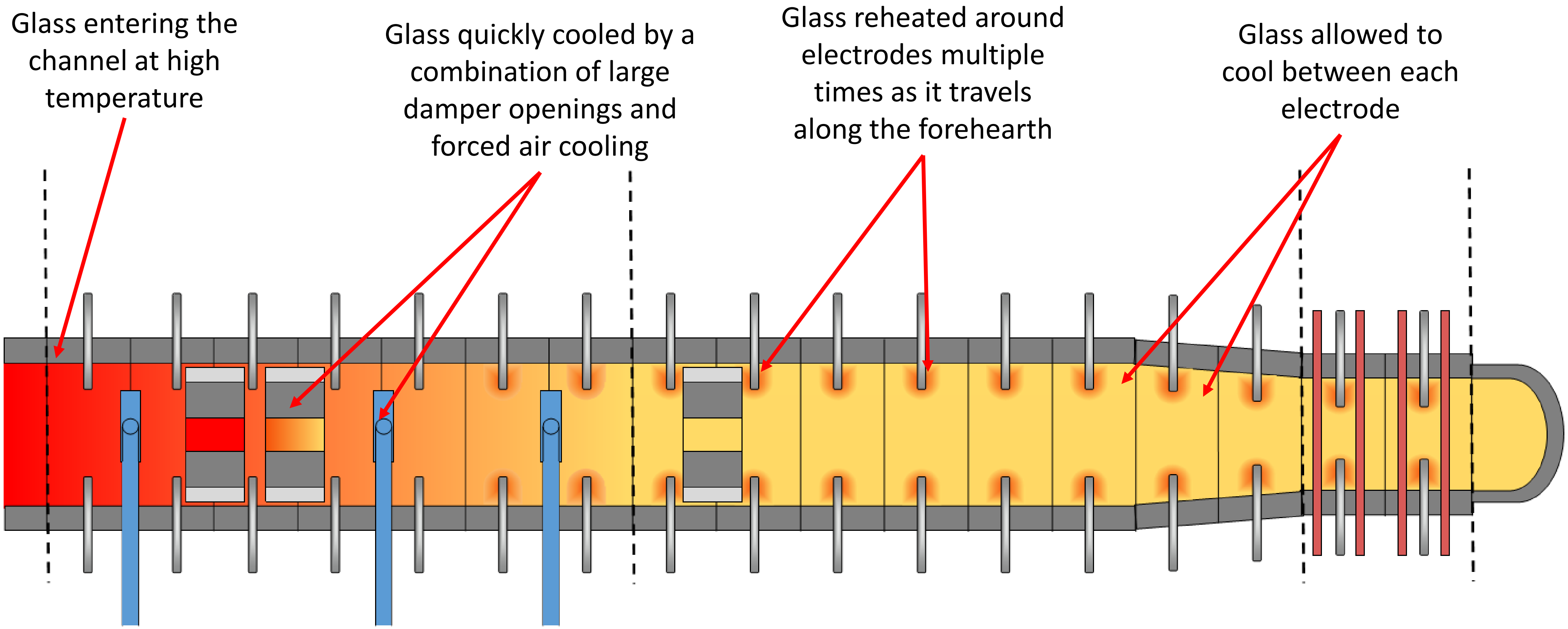


How we perceive energy is released between pairs of electrodes connected across the forehearth channel.

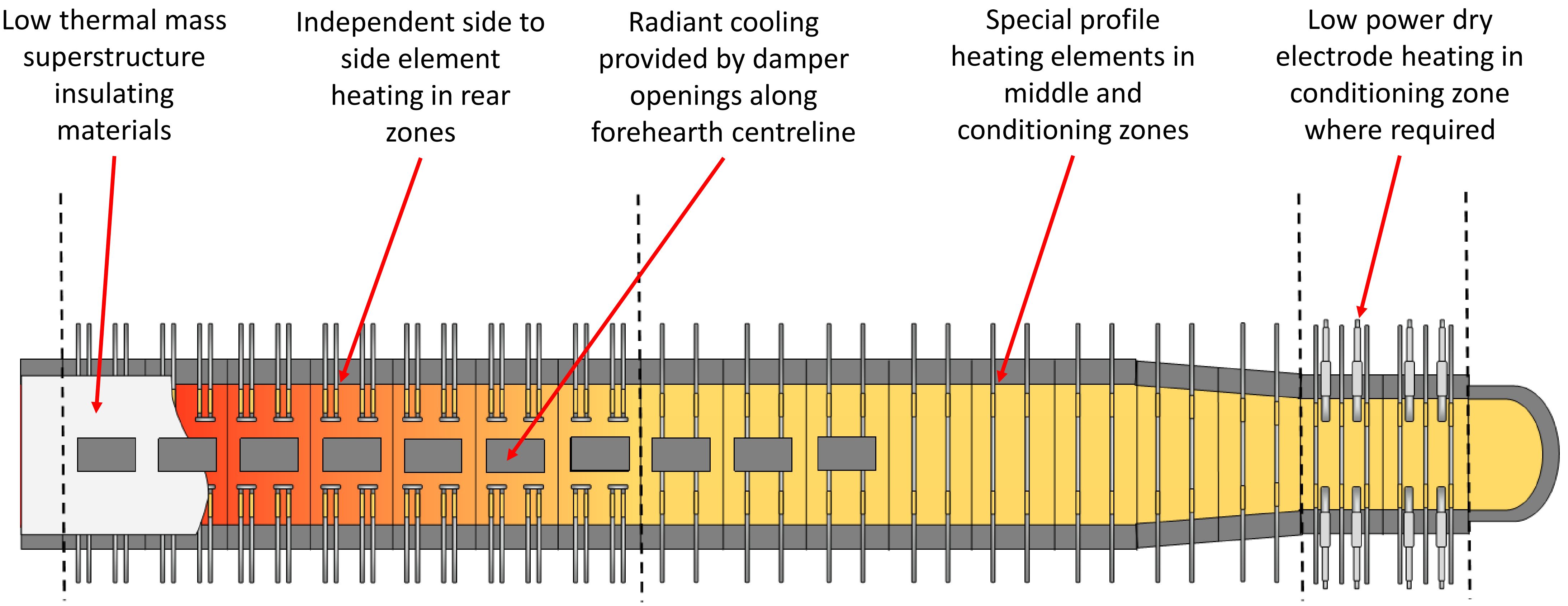


How energy is actually released between pairs of electrodes connected across the forehearth channel.

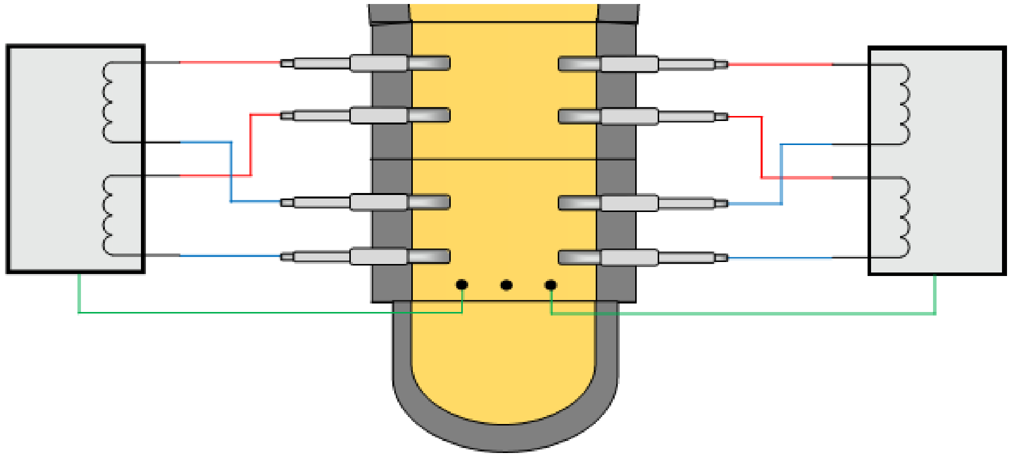
The Risk of Glass Reboil



The Electroflex All-Electric Forehearth

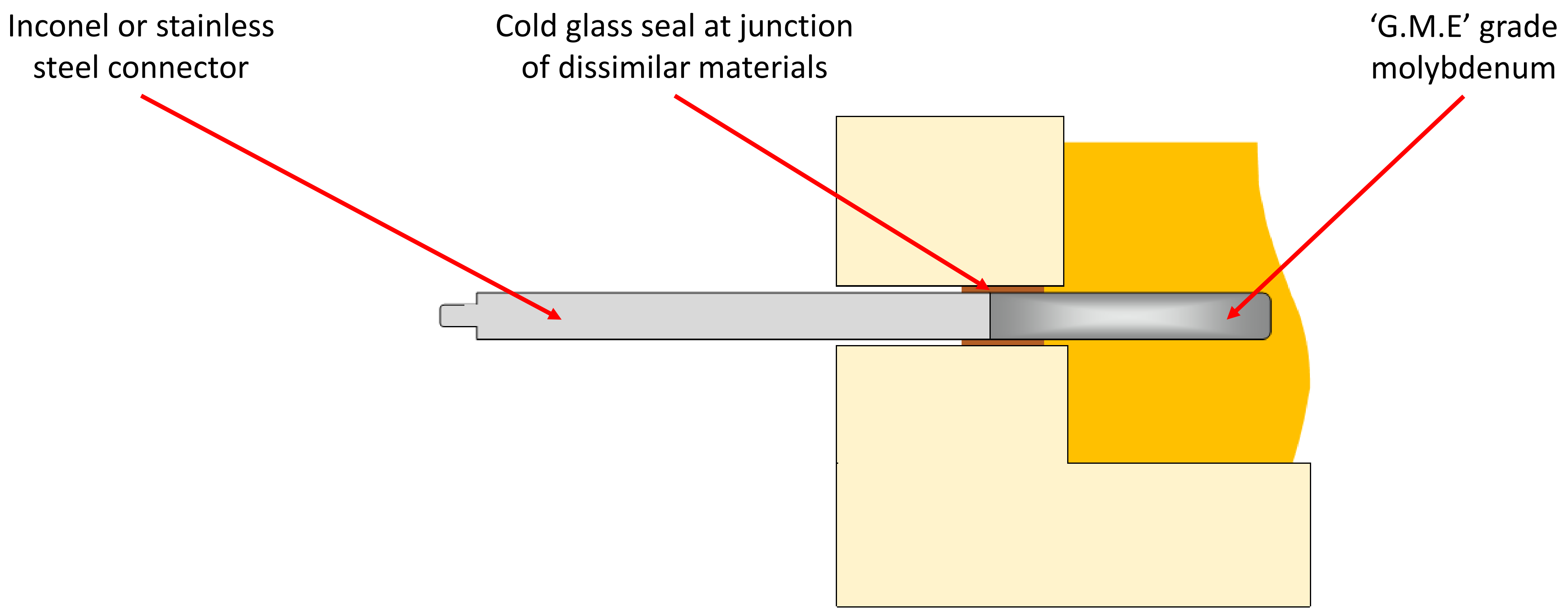


Dry Electrode Usage

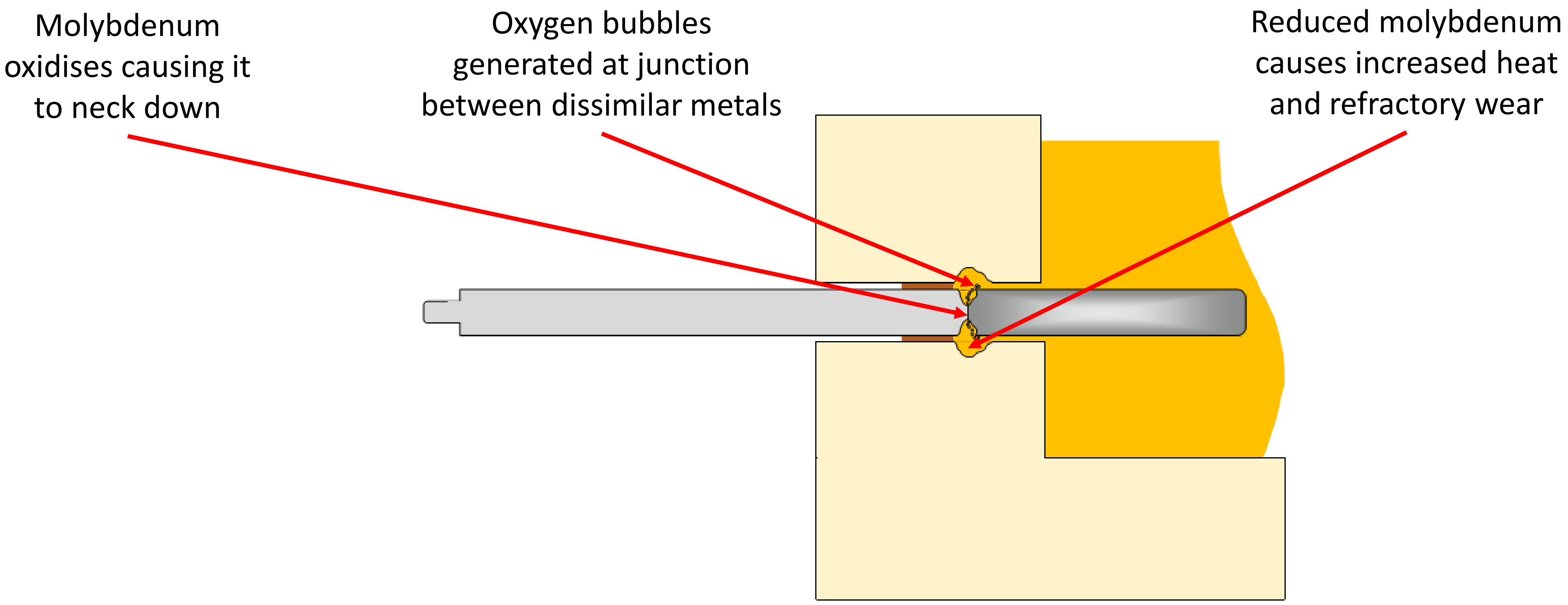


- Electrodes limited to conditioning zone only.
- Only used where low transmission glasses are to be produced.
- Very low/minimal power input.
- Circuit designed to promote side to side heating.
- Utilise temperature setpoint control to assist in gob shape and weight stability.

Simple Dry Electrode Design



Simple Dry Electrode Design



The Electroglass Sheathed Dry Electrode Design

Calculating Capital Investment Costs & Operating Cost Savings

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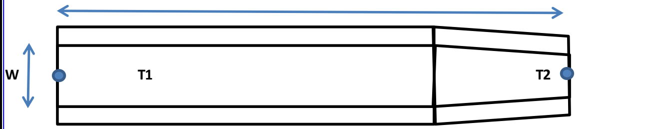
Forehearth Gas-to-Electric Conversion Data Sheet

To enable us to prepare an operating cost comparison and quotation
for conversion of your existing gas forehearth to an Electroglass electric forehearth,
please provide the following data

Company name	
Contact name	
Email address	

Forehearth designation	
Scheduled date of next repair	
Estmated cost of next repair (to existing design), excluding glass contact channel blocks.	



Length L		Channel Width W		Glass Depth	

Typical operating conditions, - existing gas forehearth

Case	Days per year at this pull. (RATIO)	Glass Colour	Pull Tonnes/ Day	Inlet Temp. T1 Deg C	Spout Entry Temp. T2 Deg C	Gas Consumption		Combustion and Cooling Fans Power Consumption	
						Quantity	Units	Quantity	Units
1									kW
2									kW
3									kW
4									kW
5									kW

Energy Costs	Cost	Unit
Gas		
Electricity		kWhr

- Determining energy consumptions, operating COST savings, capital investment costs and payback times is a quick process.
- Electroglass Data Sheet makes it easy to provide information required.
- Operating energy COST savings ranging from 70% to more than 90% - often worthwhile looking at a range of forehearths and distributors to determine where best to place any investment.

CASE 1

Pull - 60 tonnes/day

Temperature Drop - 53°C

Gas Heated Forehearth		All-Electric Forehearth
504 m³/day	Energy Consumption	**46** kW/day
4893 kWh/day	Energy Consumption (kWh)	**1104** kWh/day
289 kW	Total Structural Losses	**85 kW**

- **70.6% Reduction** in overall losses
- **94.2% Reduction** in operating COST
- **$3,171,141 Saving** over a 10-year campaign

CASE 2

Pull - 85 tonnes/day

Temperature Drop - 64°C

Gas Heated Forehearth		All-Electric Forehearth
840 m^3/day	Energy Consumption	**13** kW/day
8156 kWh/day	Energy Consumption (kWh)	**312** kWh/day
402 kW	Total Structural Losses	**62 kW**

- **84.6% Reduction** in overall losses
- **98.7% Reduction** in operating COST
- **$4,328,900.00 Saving** over a 10-year campaign

CASE 3

Pull - 130 tonnes/day

Temperature Drop - 20°C

Gas Heated Forehearth		All-Electric Forehearth
960 m^3/day	Energy Consumption	**60** kW/day
9321 kWh/day	Energy Consumption (kWh)	**1440** kWh/day
478 kW	Total Structural Losses	**89 kW**

- **81.3% Reduction** in overall losses
- **90.3% Reduction** in operating COST
- **$7,424,246.00 Saving** over a 10-year campaign

Conversion During Furnace Campaign

7-10 Days

CONTROL EQUIPMENT INSTALLED & SYSTEM TESTED

14-17 Days

FOREHEARTH STOPPED & DRAINED

EXISTING FOREHEARTH DEMOLISHED

EXISTING STEEL CASINGS MODIFIED

NEW SUBSTRUCTURE & SUPERSTRUCTURE BUILT

DAMPERS & BRACINGS INSTALLED

HEATING ELEMENTS & THERMOCOUPLES INSTALLED

FOREHEARTH HEATED UP

2-3 Days

SYSTEM COMMISSIONED & OPERATORS TRAINED

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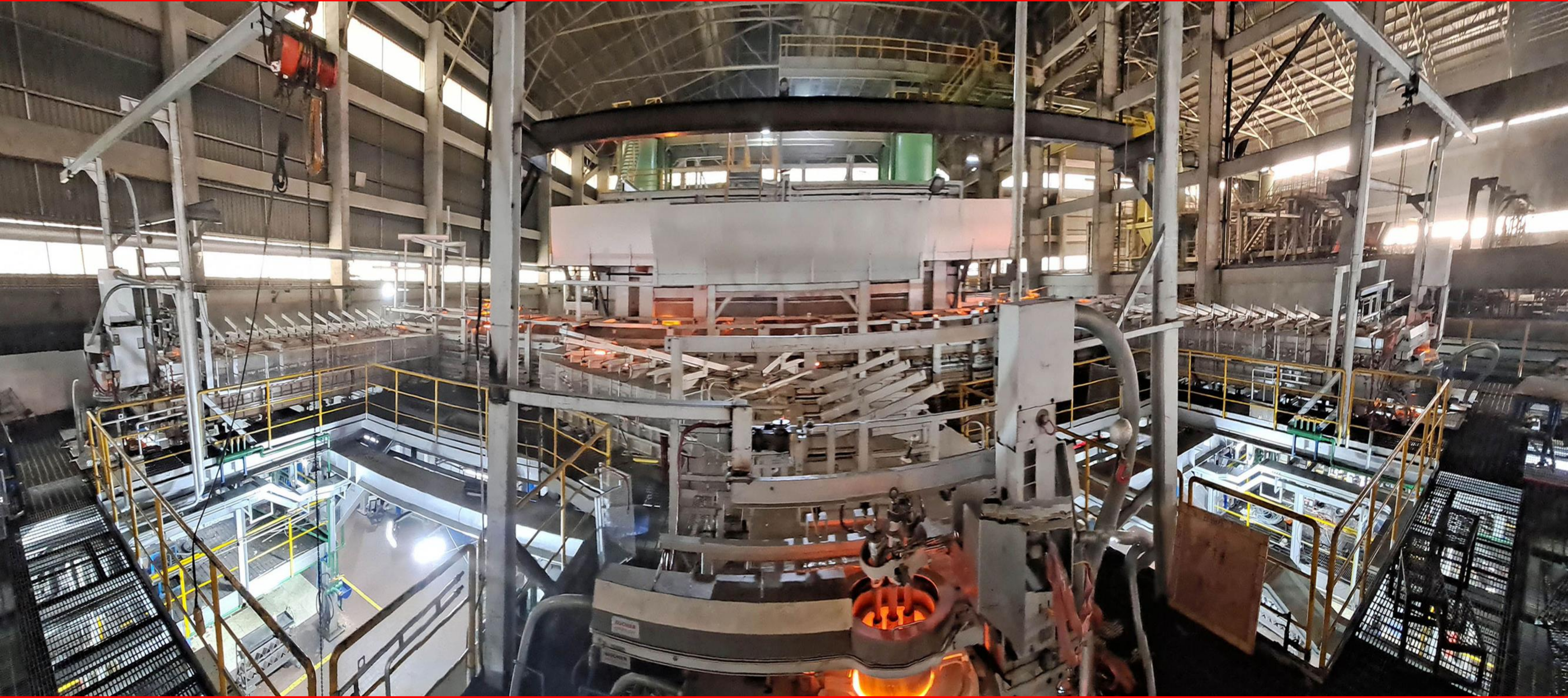

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www.electroglass.co.uk ELECTROGLASS info@electroglass.co.uk

FH1.3 Entry	
Glass	1256 deg

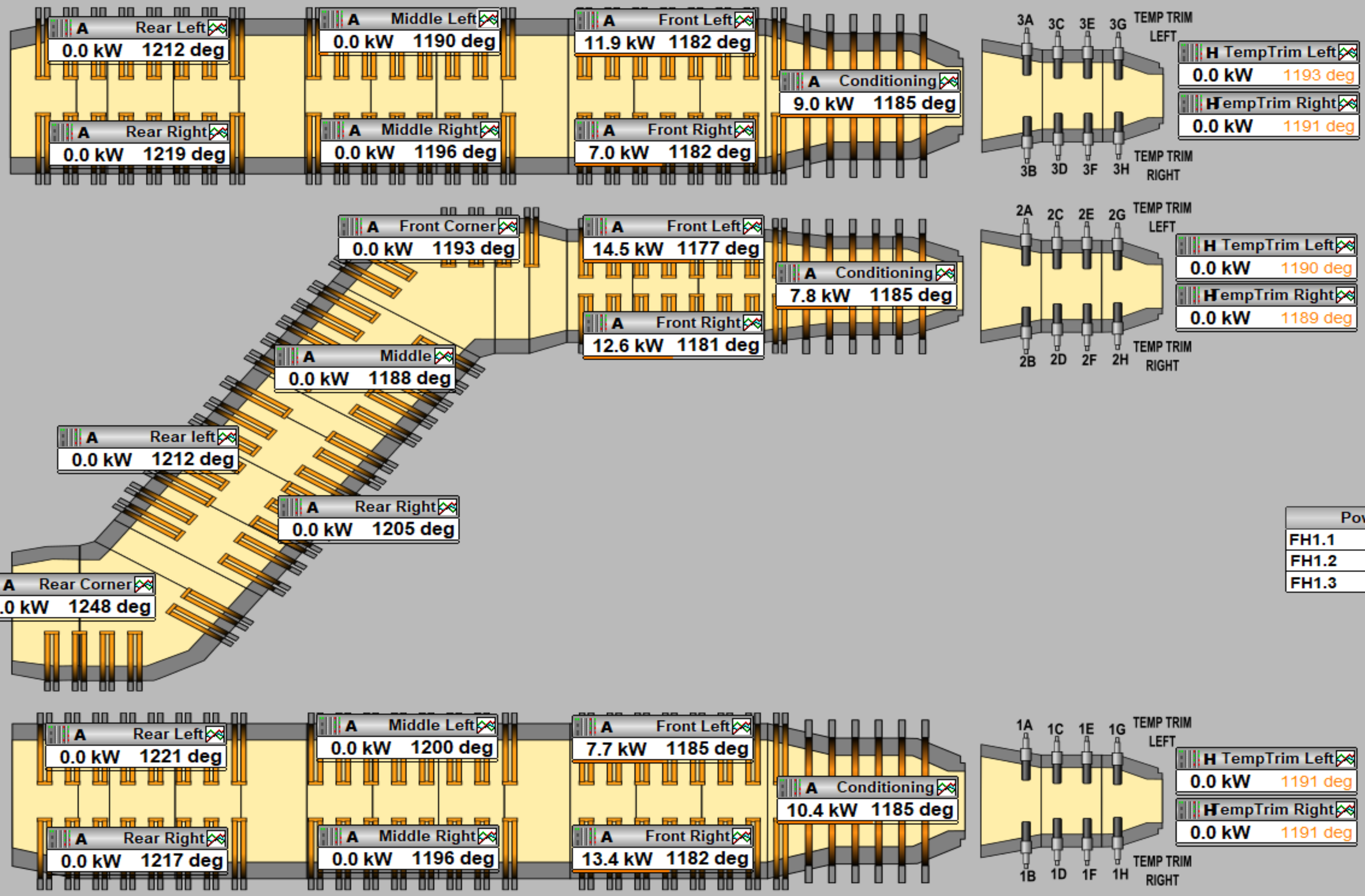
F3 Accept Alarm

FH1.2 Entry	
Glass	1274 deg

F2 Accept Alarm

FH1.1 Entry	
Glass	1250 deg

F1 Accept Alarm



Total kW	TH Index-OI	F3 Pull
27.9 kW	97.8	119.0 t/d

Tri Level Temperatures			
FH1.3	Left	Middle	Right
Upper	1188 deg	1188 deg	1188 deg
Middle	1193 deg	1192 deg	1191 deg
Lower	1190 deg	1196 deg	1189 deg

Total kW	TH Index-OI	F2 Pull
34.9 kW	96.1	116.0 t/d

Tri Level Temperatures			
FH1.2	Left	Middle	Right
Upper	1188 deg	1191 deg	1187 deg
Middle	1190 deg	1197 deg	1189 deg
Lower	1189 deg	1197 deg	1189 deg

Power Table kWhrs		Reset
FH1.1	23041 kWhrs	
FH1.2	19681 kWhrs	
FH1.3	17754 kWhrs	

Total kW	TH Index-OI	F1 Pull
31.4 kW	98.0	117.0 t/d

Tri Level Temperatures			
FH1.1	Left	Middle	Right
Upper	1190 deg	1190 deg	1191 deg
Middle	1191 deg	1194 deg	1191 deg
Lower	1189 deg	1194 deg	1189 deg

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Run DBF Log Report

Manager Login

Grahame Stuart
Project Sales Engineer

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W: www.electroglass.co.uk **E:** info@electroglass.co.uk **T:** +44 1268 565577